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British Guiana.

REPORT

OF THE

DEPARTMENT OF SCIENCE AND
AGRICULTURE,

FOR THE YEAR

1924.



Printed by the Authority of His Excellency the Governor.

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REPORT OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE FOR THE YEAR ENDED 31st DECEMBER, 1924.

1. The following is my report on the working of the Department of Science and Agriculture for the year ended 31st December, 1924. Appended to it are detailed reports relating to the several divisions of the Department as follows:—

(1) The work of the Chemical division appears in the report of the Government Analyst.—Appendix I.

(2) The general work of the Botanical division is dealt with in the report of the Botanic Gardens.—Appendix II.

(3) The report of the Assistant Botanist and Mycologist.—Appendix III.

(4) The report on Agricultural Instruction comprises.—Appendix IV.

(5) The work of the Biological division is shown in the report of the Economic Biologist.—Appendix V.

(6) The work of the Veterinary division comprises the report of the Veterinary Surgeon.—Appendix VI.

The Meteorological observations for the Calendar year 1924, taken at the Botanic Gardens, Georgetown and at other stations in the Colony, will be published as a separate report.

STAFF.

2. *Head Office.*—As shown under the Chemical Division the Assistant Director was absent on leave from the 26th of May to the end of the year. Mr. E. M. Peterkin, Chief Clerk and Secretary of the Board of Agriculture, was absent from the Colony on leave from the 1st January to the 11th October, during his absence Mr. J. A. V. Bourne acted as Clerk and Secretary. Miss A. Jardim, was promoted on 15th February to be the Senior Clerical Assistant and Miss J. Pestano filled the vacancy caused by her promotion. Miss A. Jardim was absent on sick leave from the 30th May to the 30th June. Miss N. I. Valladares was appointed a Clerical Assistant on the 1st August.

Mr. C. L. G. Bourne, the Director's Scientific Assistant and Editor of the Board of Agriculture Journal, was absent from the Colony on leave from 7th February to 3rd March.

Chemical Division.—Mr. W. Francis, F.I.C., Deputy Government Analyst and Geologist, was absent from the Colony on leave from the 26th May to the end of the year. Mr. N. Newsam, Second Assistant Analyst, was absent from the Colony on leave from 20th August to 29th September. Mr. S. Young, 1st Laboratory Assistant, was transferred to the Agricultural Division on 15th September, and Mr. D. Iloo, Senior Clerical Assistant, was promoted to be 1st Laboratory Assistant from the 15th February.

Botanical and Agricultural Divisions.—Mr. A. A. Abraham, Horticultural Superintendent, was absent from the Colony from 9th February to 21st September, having been seconded for work at the British Empire Exhibition. Mr. H. Cole, Clerical Assistant, was promoted to be an Agricultural Assistant on the 16th September and Mr. G. L. Leitch was appointed a Clerical Assistant on 1st November.

Biological Division.—Mr. L. D. Cleare, Economic Biologist, was absent from the Colony on leave from the 20th March to the 28th April.

Veterinary Division.—Mr. A. Seton Milne, M.R.C.V.S., carried out his duties as Government Veterinary Surgeon during the period under review.

EXPENDITURE.

3. The total vote assigned to the Department by the Combined Court at its Session in November, 1923, for the year 1924 was \$92,406; of this amount there was at December 31st, 1924, an unexpended balance of \$5,076.69 as shown in the following:—

TABLE I.
ANNUAL ESTIMATES.

No. of Sub-vote.	Sub-vote.	Balances Unexpended.	Excess Expenditure.
1-15	Personal Emoluments—Fixed Establishment	\$ 33 07	
16-26	Personal Emoluments—Exclusive of Fixed Establishment	903 39	
OTHER CHARGES.			
27	Allowances for upkeep of Bicycles	52 40	
28	Commuted Travelling	43 22	
29	Travelling Expenses (General)		\$ 100 63
30-36	General Expenses	245 20	
37	Chemical	57 79	
38	Gas and Electrical Heating	46 49	
39	Geological and Mineralogical		80 59
40	Botanical	11 59	
41	Meteorological	64 05	
42	Biological	64	
43-44	Botanic Gardens		6 17
45	Other Government Gardens and Grounds	3 78	
46	Herbice Gardens	28 68	
47	Purchase, Production and Distribution of Seeds and Plants	8 80	
48-49	Experimental Fields	195 55	
50-52	Department's Station and Arable Farm, Onderneeming	516 04	
53	Live Stock—Purchase of	200 90	
54	Live Stock—Maintenance of	930 24	
55	D'Urban Park	465 02	
56	Cutting Grass for Police Horses	213 98	
57	Advertising	39	
58	Grants-in-aid		89 19
59	Subsidies	155 00	
60	Agricultural Apprentices	500 89	
61	District Gardens		55 94
62	Veterinary Preventive Measures	398 00	
63	Plant Pests Preventive Measures	128 10	
65	Contingencies	200 00	
	TOTAL	\$ 5,409 21	\$ 332 52

4. The payments into the Treasury during the year were as follows:—

Laboratory fees	...	\$ 232 50
Botanical Division: Economic & Ornamental plants	...	708 23
Agricultural Division	...	873 66
Sale of Official Publications	...	16 86
		<u>\$1,831 25</u>

A sum of \$4,621.86 was also paid into the Treasury, being fines inflicted by the Magistrates on the vendors of adulterated foodstuffs who were prosecuted on the strength of certificates issued by the Chemical Division of this Department.

5. The following are the abstracts of the Meteorological observations recorded at the Botanic Gardens, Georgetown, and at the Penal Settlement, Mazaruni, during the year 1924;—

Meridian of longitude for calculation of time adopted as standard

in the Colony	...	60° W.
Hours slow of Greenwich time	...	3 hrs. 45 mins.

GEORGETOWN.

The meteorological station is situated in the Botanic Gardens, at a distance of 1.45 miles south of the Coast-line. The hours of observation are 7 a.m. and 1 and 6 p.m. local official time. The height of the barometer is six feet six inches above the mean sea-level.

During the year 1924 the air temperature in the shade for the months of January, February, June, and December was lower than the means recorded over the period 1846-1924. The highest temperature recorded was 89.0° on the 22nd November, while the lowest was 69.5° recorded on the night of 18th March. The mean shade temperature for the year was 80.5° or 1° above the average from 1846 to 1923. The total rainfall was 86.18 inches as compared with 80.52 inches in the year 1923 and with 91.77 inches for the period 1880 to 1923. The monthly distribution of the rainfall was abnormal, the precipitation in January being 3.57 inches below the average of 1846 to 1923, while the precipitation in March was .28 inches or 6.41 inches below this and was followed by June with a fall of 15.85 inches, or 4.49 inches above the average. For the months of July to December inclusive, the total rainfall was 8.11 inches higher than normal. The evaporation from a free water surface, a six feet square tank, at the ground level was 59.05 inches as compared with a normal evaporation of 57.90 inches; the evaporation for 1924 being 68.28% of the total rainfall. The total amount of the bright sunshine for the year was 2,671.2 hours as compared with 2,682.4 hours in 1923 and with 2,415.5 in 1922 and was 234.6 hours above the average from 1846 to 1923. The mean radiation temperature (blackened bulb in vacuo) was 7.2° higher than normal and $.6^{\circ}$ higher than that of the previous year, the maximum monthly record during the year being 153.1° for November while the highest daily record, 165° , occurred on the 31st October. The mean minimum temperature recorded at night on grass was 1.4° higher than the average. The mean velocity of the wind was 6.88 miles per hour the maximum velocity being 18.75 miles per hour.

MAZARUNI.

A sub-station established at the Penal Settlement, Mazaruni River, is in longitude $58^{\circ} 38' 45''$ and latitude $60^{\circ} 23' 35''$ N. at a distance of 42 miles south of the coast-line. The hours of observation are the same as at the main station in Georgetown. The height of the barometer is 55 feet above mean sea-level. During 1924 the mean air temperature in the shade was 78.3° F. the maximum temperature recorded being 91° on the 23rd and on the 28th of March, while the minimum, 65° occurred on the 26th January, as well as on 4 nights in February. The total rainfall was 144.51 inches or 43.41 inches higher than the average of preceding years. The general distribution of the rainfall was similar to that at Georgetown except that during the month of June 5.19 inches less of rain fell at Mazaruni than in Georgetown. For the month of December the rainfall at this station was 12.81 inches in excess of that at Georgetown for the same month. Rain fell on 197 days in the year as compared with 204 days in Georgetown. The total amount of bright sunshine recorded during the year was 2,146.1 hours as compared with 2,671.2 hours at Georgetown.

GENERAL AGRICULTURE.

6. The areas under experimental cultivation at the different stations of the Department during the year were as follows:—

TABLE II.

Products.		Acreage.
Rubber, Para, ...	...	36
Rubber, Sapium ...	...	2
Rubber, Other sorts.	..	5
Limes ...	...	7
Coconuts ...	..	2
Sugar Cane ...	...	10
Rice ...	...	14
Balata ...	...	4
Tonka Beans ...	...	1
Carludovica Palms...	...	1
Ground Provisions (various)	...	5
Bananas ...	...	3

Products.		Acreage.
Cotton	...	1
Fibres	...	1
Legumes	...	2
African Oil Palm	...	3
Corn (Maize)	...	1
Tibicusi—Letter Wood	...	1
Coffee (various)	...	1

This table does not include the acreage under experimental cultivation at Onderneeming Farm. There are planted on that farm at present the following :—

3,650 Cacao trees.
 3,200 Coffee trees.
 3,700 Lime trees.
 600 Para Rubber trees.
 800 Coconut palms.

7. *Sugar*.—As indicated in paragraph 40 of the 1919 report, the Agricultural Experiments and the Field trials in sugar-cane are now dealt with in the report of the British Guiana Sugar Planters' Experiment Station Committee.

8. The total area in sugar-cane cultivation in the Colony during the year 1924 was 55,130 acres, a decrease of 2,684 acres on the area occupied by the crops of 1923. Enquiries show that the area under cultivation for the ensuing year 1925 will be more than the area occupied in 1924, as 57,190 acres are reported to be under sugar-cane on December 31st, 1924, of which 3,800 acres are returned as cultivated by cane-farmers.

9. The following Table shows the area occupied by the principal varieties of sugar-cane under cultivation on sugar estates for the crops of 1925 as compared with those so occupied for the years 1923 and 1924 :—

TABLE III.

THE PRINCIPAL VARIETIES OF SUGAR CANE IN BRITISH GUIANA UNDER CULTIVATION DURING 1923, 1924 AND 1925.

AREAS IN BRITISH ACRES.

Variety.	1923.	1924.	1925.	Increase or Decrease on 1924.	
	Acres.	Acres.	Acres.	Increase.	Decrease.
D. 625	36,444	37,108	37,413	305	
Bourbon	1,506	391	323		68
D. 625 mixed with Bourbon and other seedlings	6,410	7,126	9,201	2,075	
D. 145	3,969	3,496	2,649		847
D. 118	1,978	1,656	1,576		80
B. 208	1,101	625	403		222
R.P. 8	844	498	461		37
Diamond 37	312	363	316		47
B.H. 10 (12)	243	295	190		105
Diamond 185	495	173	...		173
Ba. 6032	300	138	89		49
D. 109	203	125	127	2	
D. 419	606	102	84		18
Diamond 581	85	85	55		30
P.L. 2	64	79	103	24	
D. 179	64	52	46		6
E. 4396	53	52	...		52
G. Transparent	416	38	29		9
D. 167	50	37	51	14	
R.P. 20	75	35	30		5
R.P. 21	46	29	20		9
Java seedlings	56	26	20		6
D. 199	24	24	25	1	
P.L. 374	16	16	...		16
Small areas of other varieties and areas under varieties unenumerated	1,414	149	179	30	
Total Estates' Canes	56,774	52,718	53,390	672	...
Total Farmers' Canes	1,040	2,412	3,800†	...	...
TOTALS	57,814	55,130	57,190	...	...

† Areas at Plns. Anna Regina and Hope transferred to Farmers' Canes.

10. The following Tables IV. and V. indicate the relative percentage distribution of the various kinds of sugar-cane under cultivation thereon during the crops of 1921, 1922, 1923, 1924 and 1925 and the distribution of the sugar canes according to their origin :—

TABLE IV.

Variety	For crops of				
	1921.	1922.	1923.	1924.	1925.
D. 625	56.5	59.4	65.4	70.4	70.1
Bourbon	3.5	2.5	2.7	0.7	0.6
D. 625 mixed with Bourbon and other Seedlings	13.9	15.2	11.5	13.5	17.2
D. 145	7.5	7.3	7.1	6.6	4.9
D. 118	4.8	4.1	3.6	3.1	2.9
Providence 8	1.6	1.3	1.5	1.0	0.9
B. 208	3.4	3.0	2.0	1.2	0.8
Diamond 37	0.2	0.3	0.6	0.7	0.6
B.H. 10 (12)	0.2	0.3	0.4	0.6	0.3
D. 109	0.5	0.5	0.3	0.2	0.2
Diamond 185	1.3	1.0	0.9	0.3	...
Ba 6032	0.3	0.4	0.5	0.3	...
D. 419	2.7	1.6	1.1	0.2	...
Other Varieties unenumerated	3.6	3.1	2.4	1.2	1.5
	100.0	100.0	100.0	100.0	100.0

TABLE V.

	1921.	1922.	1923.	1924.	1925.
Bourbon and other old Varieties	8.8	8.2	9.2	4.8	5.1
Java	1.1	0.4	0.1	0.1	0.1
Barbados	4.4	4.1	3.2	2.2	1.4
British Guiana :—					
Plns. Diamond and Providence	3.3	3.5	3.7	2.6	2.2
Botanic Gardens	82.4	83.8	83.8	90.3	91.2
	100.0	100.0	100.0	100.0	100.0

11. The average yields in tons of commercial sugar per acre of the principal varieties reaped during the crops of 1924 as deduced from returns supplied by the managers of the sugar plantations were as follows :—

TABLE VI.

Varieties of Sugar-cane.	Plantations.		Tons Sugar per acre.	
	No. reporting.	Areas reported in acres.	Mean.	Maximum.
B.H. 10 (12)	7	189	2.13	3.20.
G. Transparent	3	18	2.12	2.37
D. 145	9	2,688	1.99	2.50
Bourbon	6	77	1.98	2.72
B. 208	4	614	1.96	2.37
D. 118	12	1,451	1.82	2.51
Ba. 6032	4	142	1.82	3.00
D. 625	23	28,797	1.81	2.91
D. 625 mixed with Bourbon and other seedlings	22	7,791	1.80	3.00
D. 419	2	62	1.80	1.87
D. 109	4	72	1.43	1.70

12. As owing to financial and to labour difficulties many of the smaller plantations were not able to keep up their cultivation as they would otherwise have done, so that their crops were short, it is desirable to record separately the results obtained by the larger and more favourably situated plantations. These results were :—

TABLE VII.

Varieties of Sugar-Cane.	Plantations.		Tons sugar per acre.	
	No. reporting.	Areas reported in acres.	Mean.	Maximum.
B.H. 10 (12) ...	4	163	2.35	2.73
Diamond 37 ...	2	364	2.32	2.43
D. 625 ...	15	22,651	2.09	2.91
Bourbon ...	5	54	2.05	2.72
D. 145 ...	7	2,864	2.02	2.50
B. 208 ...	4	614	1.86	2.37
D. 118 ...	10	1,316	1.84	2.51
Ba. 6032 ...	4	142	1.82	2.00

13. The results of large-scale field-trials with other varieties on the Sugar Plantations are shown in the following table :—

TABLE VIII.

Variety.	Acreage.	Yield.
Diamond 581 ...	81	3.02
Diamond 37 ...	345	2.43
D. 376 ...	10	2.30
Java ...	5	2.18
Diamond 185 ...	164	2.14
P.L. 2 ...	61	2.09
R.P. 8 ...	426	2.05
D. 179 ...	44	2.00
D. 157 ...	17	1.95
B. 3412 ...	15	1.90
R.P. 20 ...	33	1.84
R.P. 11 ...	27	1.57
P.L. 264 ...	16	1.31
P.L. 374 ...	15	1.22

14. The production of sugar on the sugar plantations for the year 1924 was 90,875 tons from 48,836 acres as compared with 90,758 tons in 1923 from 48,014 acres, while the export amounted to 85,896 tons, the latter an increase of 2,729 tons on that of 1923. The export of rum was 769,308 proof gallons as compared with 420,996 gallons in 1923. 1,160,677 gallons of molasses were exported during the year. The export of molascuit or cattle food was 1,324 tons.

15. The following Table shows the actual productions of sugar and the amounts exported during the years 1911-1924 :—

TABLE IX.

	SUGAR, TONS.		
	Produced.	Exported.	Home consumption or in store.
1911 ...	108,175	98,453	9,722
1912 ...	86,410	77,821	8,590
1913 ...	106,211	87,414	*19,217
1914 ...	116,622	107,138	9,484
1915 ...	119,091	116,224	2,867
1916 ...	114,292	101,650	12,642
1917 ...	108,181	114,407	...
1918 ...	107,560	93,901	13,659
1919 ...	86,971	83,139	3,832
1920 ...	87,186	83,765	3,421
1921 ...	110,985	108,270	2,715
1922 ...	101,123	90,570	10,558
1923 ...	90,758	83,166	7,592
1924 ...	90,875	85,896	4,979
□ Average 1911-24...	102,460	95,129	7,806

* Including sugar destroyed by the 1913 fire in Charlestown. □

The local consumption of sugar has been, in round figures, during the period 1911-1924, 7,800 tons a year.

The following Table shows the annual acreage planted in sugar cane, the acreage reaped each year and the total amount of sugar produced, for the years 1919 to 1924 and the average for the period 1919 to 1924. It also shows the average production of sugar per acre under cultivation and per acre reaped :—

TABLE. X.

Period.	Area under cultivation in acres. (English acres.)	Area reaped per annum. Acres. (English acres.)	Average Tons of Sugar per annum.		
			Total.	Per acre under cultivation.	Per acre reaped.
1919	...	70,876	86,971	1.23	1.55
1920	...	69,532	96,210	1.38	1.65
1921	...	63,420	107,815	1.70	1.85
1922	...	60,761	101,095	1.66	1.79
1923	...	57,814	89,811	1.55	1.78
1924	...	57,200	90,875	1.60	1.86
1919-24	...	63,267	95,614	1.52	1.73

RICE.

Experimental.

16. The experiments with varieties of rice were continued at the Experimental Fields. As in the previous years the varieties of proven value were planted in the North field on duplicated half acre plots. The following yields were obtained :—

TABLE XI.

Selected Varieties.		Plots.	Bags of 140 lbs. per acre.
Variety or Strain.			Yield.
Variety 75	...	1, 7, 11 & 15	22.8
Strain 77	...	5 & 17	28.2
" 78	...	9 & 18	26.6
" 79	...	6 & 10	26.2
Variety Demerara Creole	...	2 & 8	26.1
Variety H. 6	...	4 & 13	23.6
Strain H. 7	...	12	25.4

Certain strains, Nos. 76, 77, 78, 79 and H. 7 which when selected years ago showed certain characters differing from those of the parent. Although they have to some extent reverted in appearance to the original types, their average yields have been considerably in excess of those of the parent types and having proved to be constant as regards field yield have been numbered as follows :—

<i>Old.</i>		<i>New.</i>	
75 strain	1	No. 76	
75 "	2	No. 77	
75 "	3	No. 78	
75 "	4	No. 79	
H6. "	1	H. 7	

17. The yields on the whole were below the average of previous years. During the period of eighteen years in which trials with the varieties and strains have lasted the mean results have been as follows :—

TABLE XII.

Variety or Strain.	Bags of 140 lbs. per acre. Average to 1924.	Creole taken as 100 Average to 1924.
Nos. 75, 77, 78 and 79	25.3	96.9
H. 6 and H. 7	23.8	91.2
Demerara Creole	26.1	100.0

The cause of the decrease has been investigated and proved to be the depletion of the available nitrogen in the soil due to continual cropping. This accounts for a decrease of nearly 15 per cent.

18. The duplicate and quadruplicate trials of certain varieties and strains in small $\frac{1}{16}$ acre plots were continued, the Demerara Creole and No. 75 being employed for the comparison of yields. The trials gave the following results :—

TABLE XIII.

Variety or Strain.	Bags of 140 lbs. per acre.
Demerara Creole, specially selected ...	23.7
No. 75 Strain 77 ...	17.9
No. 75 Strain 79 ...	24.2
No. 75 Strain 76 ...	15.3

In this series of trials carried on over 9 crops the average yields compared with those of especially selected Demerara Creole padi taken as 100 have been :—

No. 75 Strain 77	...	...	106.3
No. 75 Strain 79	...	...	116.3
No. 75 Strain 76	...	...	90.0

19. Other varieties of padi were planted, No. 75 being used for comparison. The results were :—

TABLE XIV.

(a) Comparison of British Guiana Hybrid varieties with No. 75 :—

	Bags of 140 lbs. per acre.
No. 75 ...	25.3
Hybrid 33 ...	18.8
Hybrid 35 ...	16.2
Hybrid 37 ...	26.3

(b) Comparison of recently imported varieties with No. 75 :—

No. 75 ...	21.4
Surinam Creole ...	24.8
Honduras ...	8.8
Mackenzie City ...	14.5
Bibili E.C. (Ceylon) ...	11.3
M.D. 11 (Ceylon) ...	30.0
H.H. 3 (Ceylon) ...	8.3
H.F. 14 (Ceylon) ...	19.7
Inchasa (Ceylon) ...	18.5
Nn. 2/81 (Ceylon) ...	16.0
Suali (Ceylon) ...	17.2

Two of the varieties, M.D. 11 (Ceylon), and Surinam Creole gave results in excess of those contained with No. 75.

The following varieties after several years' experiments have been discarded as being unsuited for cultivation on our lands :—

Sapanet, Nga Kyank, Radin, Ketan Item, Bawut, Boeloc Poeti, Kunchor Kindja Ranti, Santap and Carolina Golden Grain.

In 1923 the following varieties were received from Ceylon :—

Bibili E.C., M.D. 11, H.H. 3, H.F. 14, Inchasa, Nn. 2/81 and Sulai. This has been the first trial of these varieties with the results shown above as compared with No. 75. M.D. 11 is of promise but further experiments are necessary before any definite opinion can be formed as to its probable yield on commercial lines.

20. During the year $5\frac{1}{2}$ tons of seed-padi were sold. There was not any free distribution of padi.

CULTIVATION.

21. The actual area occupied by rice cultivation in the Colony was returned at 29,406 acres, of which 10,866 acres yielded both spring and autumn crops, the area cropped being 40,272 acres. Of the total area 9,145 acres were used for rice-growing on sugar plantations. Due to the favourable weather conditions the crop was a fairly satisfactory one, resulting in 42,100 tons, equal to 673,613 bags, of 140 lbs. of padi and equivalent to 25,260 tons, or to 314,346 bags of 180 lbs. of cleaned rice. The yield per acre reaped was at the rate of 16.7 bags of padi. The rice produced was of good quality, and 4,470 tons were exported during the year 1924.

22. The rates of yields per acre reported from the various country districts varied widely. The following Table shows the yields per acre per crop in the districts :—

TABLE XV.

DISTRICT.	Acreage reaped.	Bags of Padi of 140 lbs. per acre.
North West District ...	22	2.3
Essequibo Coast ...	7,361	17.8
Essequibo River ...	4,715	17.3
West Demerara ...	4,447	17.0
East Bank, Demerara River ...	997	19.0
East Demerara ...	2,861	16.5
Mahaica-Abary ...	2,673	13.9
West Coast, Berbice ...	4,152	12.2
New Amsterdam and Berbice River ...	6,026	20.7
Courantyne ...	7,018	14.3
The Colony (Total reaped) ...	40,272	Average 16.7

23. The relation of the rice-growing industry to the sugar-cane and other agricultural industries of the Colony during the period 1903 to 1924 is summarised in the following Table XVI. in which the areas occupied by the various industries are given in British acres :—

TABLE XVI.

Period.	Sugar-cane.	Rice.	Other Products.	Total area under cultivation.
1903 ...	73,860	17,503	21,442	117,805
1908 ...	74,865	39,743	33,356	147,967
1913 ...	72,698	35,582	43,832	152,972
1918 ...	73,565	60,432	63,890	197,887
1919 ...	70,876	61,400	58,341	190,717
1920 ...	69,532	55,246	51,214	175,992
1921 ...	63,420	55,911	52,820	172,151
1922 ...	60,760	49,070	46,170	156,000
1923 ...	57,814	34,965	43,773	136,552
1924 ...	57,190	29,406	49,698	136,294

The area of land devoted in 1924 to cultivation of rice was 21.6 per cent. of the total cultivated area of the Colony, while lands occupied with sugar made up 42.0 per cent. of such area.

Very large areas of the front lands of the Colony, pre-eminently suited for the cultivation of rice, are still not so occupied.

24. The gradual extension of the rice industry is illustrated in the following Table which gives at five-yearly intervals to 1922, and thence in years, the areas in British acres under rice in the counties of the Colony, and the total yields of padi and of rice in long tons :—

TABLE XVII.

Period.	Mean Rainfall Coastal Stations Calendar Year	Areas under rice cultivation, British Acres reaped.				Yields of British Guiana.				
		Berblce,	Demerara,	Essequibo.		British Guiana total acreage. (reaped)	Padi tons.	Rice, tons (60% yield of cleaned Rice from Padi)	Tons per acre.	
				Mainland	Islands				Padi	Rice
1898-1902 ...	88.2	4,874	1,592	308	...	6,778	6,374	3,824	0.94	0.56
1903-1907 ...	99.2	8,684	4,952	3,076	1,001	17,712	17,701	10,620	0.99	0.59
1908-1912 ...	99.1	16,893	13,862	5,042	3,941	39,746	50,010	33,006	1.25	0.75
1913-1917 ...	89.6	16,406	24,372	4,685	3,930	49,695	60,560	36,336	1.22	0.73
1918-1922 ...	92.9	32,151	16,073	4,983	4,799	58,046	47,514	28,508	0.82	0.49
1923 ...	80.9	16,460	10,824	7,010	4,421	38,715	33,270	19,962	0.85	0.51
1924 ...	83.54	17,196	10,978	7,383	4,715	40,272	42,100	25,260	1.04	0.62

The marked diminution in yield per acre, since 1915 when the average yield was at the rate of 1.29 tons of padi per acre to 1922 when it had fallen to .56 ton per acre, was largely, if not entirely, due to the adoption of the unsatisfactory practice of broadcasting the seed-padi in place of transplanting from seed beds. This bad practice is being abandoned and the yield for 1924 shows a marked increase but the yield per acre is still far below its readily attainable maximum.

COCONUTS.

25. The area returned as planted in coconut palms in the Colony was 25,200 as compared with 22,970 in 1923, an increase of 2,230 acres, due to more complete returns having been made by cultivators. The practical abandonment of certain plantations owing to the prevalence of bud-rot disease, neglected control, and, still more important, unsatisfactory conditions of main and internal drainage has very greatly lessened what should have been the normal increase in planted areas. The development of the industry during five-yearly periods since 1904 is shewn in the following Table:—

TABLE XVIII.

Year.	No. of acres planted.
1904	5,140
1909	9,466
1914	15,894
1920	24,425
1924	25,201

26. The production of coconuts during 1924 was returned as 12,303,000 nuts, the export being 1,559,800 nuts. A large proportion of the crop was used for the production of oil for local use and of copra for export. The export of coconut oil was 21,804 gallons during 1924. The production of copra greatly increased, 16,508 cwts. being exported during the year under report, as compared with 8,401 cwts. in 1923. The equivalent in coconuts of nuts and products was 10,296,600 nuts.

The following Table gives the export of coconuts for quinquennial periods from 1892 to 1916:—

TABLE XIX.

Periods.	Average Annual Exports.
1892-6	80,370 nuts.
1897-1901	21,890 "
1902-06	187,300 "
1907-11	526,900 "
1912-16	1,600,860 "

Since 1914 records have been available for the annual exports of coconut oil and copra. Assuming that 60 nuts yielded one gallon of coconut oil and that 450 nuts are equivalent to 1 cwt. of copra the export of coconuts and their products, in terms of coconuts, have been as follows:—

TABLE XX.

	EXPORTS.			
	As Nuts.	As Oil.	As Copra.	Total Nuts.
1914-1921 (8 years) ...	2,452,000	1,204,000	668,000	4,324,000
1922 ...	2,131,000	1,763,500	940,500	4,835,000
1923 ...	2,650,000	1,597,000	3,780,000	8,027,000
1924 ..	1,559,800	1,308,240	7,428,600	10,296,640

27. The varieties raised at the Botanic Gardens from imported seed and from selected local nuts yielded satisfactory crops. Some especially selected nuts were distributed for planting purposes but the demand was almost negligible.

PARA RUBBER.

28. Owing to the ravages of the Para Rubber Leaf Disease and to low prices of rubber the area occupied by Para Rubber was reduced during the year to 1,655 acres. Due to low prices the trees on the stations of the Department were not bled during the year other than for the purpose of preparing samples of rubber for the British Empire exhibition; 500 lbs. of cured rubber being made for this purpose.

29. The average rates of growth of trees at the various stations have been as follows.

TABLE XXI.

Age of trees in years.	Girth in inches at 3 feet from the ground.				Age of trees.
	Onderneeming.	Issorora.	Georgetown.	Marlborough.	
1	3.0	2.0	1.0	2.0	1
2	8.7	4.5	3.3	7.0	2
3	12.7	8.0	4.7	9.0	3
4	17.7	8.5	6.5	13.0	4
5	21.0	13.2	7.0	15.5	5
6	22.2	15.2	7.3	17.0	6
7	24.0	20.4	9.7	23.9	7
8	25.2	21.5	9.7	25.2	8
9	28.7	27.5	11.7	32.3	9
10	30.0	29.0	12.3	36.0	10
11	32.6	31.8	13.0	...	11
12	34.5	35.0	13.0	...	12
13	43.7	35.5	13.0	...	13
14	44.1 (3)	38.1	14.0	...	14
15	46.9 (3)	39.6	14.0	...	15
16	48.0 (3)	40.7	15.3	...	16
17	50.0 (3)	42.1	15.4	...	17
18	51.2 (3)	...	17.4	...	18
19	51.6 (2)				
20	52.7 (2)				
21	57.5 (1)				
22	61.5 (1)				

(1) Three trees only.

(2) Seven trees only.

(3) Many of these trees were cut down in 1921.

An analysis towards the end of 1924 of the girths of the older trees planted prior to 1912 at Onderneeming and Issorora resulted as follows :—

TABLE XXII.

TREES.	TREES.			
	Onderneeming.		Issorora.	
	Number.	Per cent.	Number.	Per cent.
Girths at 36 inches from base.				
30 to 40 ...	3	5.2	...	...
41 to 45 ...	5	5.2	41	27.9
46 to 50 ...	14	24.6	56	38.1
51 to 55 ...	15	26.3	23	15.6
56 to 60 ...	14	24.6	11	7.5
61 and over ...	8	14.1	16	10.9

The numbers and girths of the trees which are now over 59 inches in circumference at the two stations are as follows :—

TABLE XXIII.

Girth Inches.		NUMBER OF TREES.				Girth Inches.	
		Onderneeming.		Issorora.			
				1923.	1924.		
		1923.	1924.	1923.	1924.		
60	1	4	2	1	60		
61	...	2	2	3	61		
62	2	...	...	3	62		
63	1	...	2	1	63		
64	1	2	3	2	64		
65	...	2	1	2	65		
66	...	...	1	2	66		
67	...	...	...	1	67		
69	...	1	...	1	69		
70	...	1	...	...	70		
74	1	...	...	...	74		
79	1	1	...	...	79		
87	...	...	1	...	87		
88	...	...	...	1	88		

BALATA.

30. Twelve thousand two hundred and thirty-four cwts. of balata were exported during the year under report. This shows an increase of three thousand and seventy cwts. as compared with 1923.

The balata trees planted experimentally at Issorora have attained the following measurements :—

TABLE XXIV.

		Circumference at 4 feet 6 inches from ground.	Height.
3 TREES 17 YEARS OLD—			
	Mean	30 inches	46 feet
	Maximum	31 "	47 "
	Minimum	27 "	41 "
43 TREES 13 YEARS OLD—			
	Mean	25 inches	39 feet
	Maximum	34 "	45 "
	Minimum	21 "	33 "
33 TREES 12 YEARS OLD—			
	Mean	23 inches	32 feet
	Maximum	27 "	39 "
	Minimum	14 "	27 "
137 TREES 11 YEARS OLD—			
	Mean	20 inches	29 feet
	Maximum	26 "	49 "
	Minimum	13 "	21 "

The mean rate of growth of the Balata trees has been slow, the average being 1.85 inches increase in circumference per annum, the maximum rate being 2.62 inches, and the minimum 1.17 inches.

Balata trees may therefore take 30 years from planting out for the trees of a group to attain the legal tappable size—a girth of 36 inches at 4 feet 6 inches from the crown of the roots although about half of them may attain this size in 20 years while the most rapidly growing trees may do it in 14 years. Hence it will not be feasible on plantations of balata trees to commence any tapping operations at an earlier period than 15 years from planting out.

COFFEE.

31. The acreage under this product during 1924 was returned at 5,765 acres. This area is occupied almost entirely with Liberian coffee. About 100 acres are planted with coffee in the empoldered areas of sugar plantations. The areas returned as under cultivation in coffee during the two preceding years were 4,096

and 4,240 acres respectively; but many cultivators who during these years had more or less abandoned the cultivation of their coffee fields have on account of high prices again brought the coffee thereon into cultivation and have to some extent added to the area occupied by coffee. The extent of the area under cultivation with coffee during recent years is indicated by the following table :—

TABLE XXV.

Year.	Area stated to be under Coffee cultivation.	
1905	1,432 acres.
1910	2,546 „
1915	4,468 „
1920	5,050 „
1921	5,030 „
1922	4,240 „
1923	4,096 „
1924	5,765 „

The quantity of coffee exported during 1924 was 4,581 cwt.

Most of the coffee grown in the Colony is consumed locally, that exported forming only a small proportion of the crop gathered.

CACAO.

32. The area reported as under cacao was 1,918 acres.

The lack of progress of the cacao-growing industry during the past 17 years is shown by the following table :—

TABLE XXVI.

Year.	Areas under Cacao.	
1905	1,994 acres.
1910	2,016 „
1915	2,020 „
1923	1,903 „
1924	1,918 „

All the cacao produced is used locally either in the production of chocolate or of confectionery. There are extensive belts of land on the northern reaches of the rivers of British Guiana well suited in climate, in altitude and in facilities for drainage for cacao-growing, and it is to be greatly regretted that this cultivation has not largely increased.

LIMES.

33. The area returned as planted in lime trees in the Colony during 1924 was 711 acres, the reduction in area being due to the abandonment of the cultivation at Agatash where the manufacture of citrate of lime and of concentrated lime juice failed to give remunerative results. The industry is still carried on at Plantation Providence, Berbice and at the Onderneeming Government Farm, Esse-
quibo.

The returns from these plantations show that 9,650 gallons of concentrated lime juice and 486 gallons of essential oil of limes were produced during 1924.

There was not any citrate of lime exported whilst the exports of lime juice and of essential oil of limes were 9,650 lbs. and 396 gallons respectively.

GROUND PROVISIONS.

34. The acreage returned as being under ground provisions was 14,444 acres as compared with the maximum area of 18,239 acres in 1915, and with an area of 11,924 acres in 1923.

It is frequently put forth as a proof of the lack of business acumen and energy on the part of the smaller farmers of British Guiana that large quantities of tropical "ground-provisions" are imported from the West Indian Islands and elsewhere in the tropics for use in the Colony. The imports during 1924 of the principal kinds of "ground-provisions" giving an equivalence of the numbers of acres necessary to produce them were as follows :

Products.	Bags and Barrels Imported.	Acres Required for Production
1. Sweet Potatoes	21,425 bags	478
2. Yams	55 "	2
3. Pulses (Peas, Dholls, etc.) ...	12,176 "	2,645
4. Pea Nuts	2,790 "	207
		3,332

The total acres required for the production of the above "ground-provisions" are 3,332. It would be easily feasible for the smaller farmers of British Guiana to increase the acreage under "ground-provisions" to say 17,800 acres and on these to produce the various products which are at present imported.

On the other hand the export of rice during 1924, was 4,470 tons, the produce at average rates of yield of 6,666 acres. It is evident that the transfers of agricultural foodstuffs are very greatly in favour of British Guiana. Should British Guiana cease to be a reliable market for the West Indian Islands' food-products the planters and farmers in those islands could not be expected to avail themselves of the Colony's production of its staple—rice.

AREA UNDER AGRICULTURAL PRODUCTS.

35. The following Table shows the number of acres under cultivation in 1924 with the more important products in the three counties. The records have been collated from the returns made to the District Commissaries or to the District Agricultural Officers by cultivators. As in former years, the figures are minimum ones, many cultivators being determined not to give reliable information regarding the acreages of their lands under cultivation and more especially accurate returns of the crops obtained therefrom owing to their idea that the statistics are required for purposes of future taxation instead of as guides as to the Colony's Agricultural progress :—

TABLE XXVII.

Counties.	Nature of Crops and Number of Acres at 31st December, 1924.								
	Canes.	Rice.	Coconuts.	Cacao.	Coffee.	Rubber.	Limes.	Ground Provisions.	Total.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
County of Berbice ...	19,030	15,797	3,648	30	11	40	411	3,311	42,278
County of Demerara ...	35,155	6,335	14,300	1,630	3,056	1,039	84	6,613	68,212
County of Essequibo ...	3,005	7,274	7,253	258	2,698	576	216	4,520	25,800
Total in Acres ...	57,190	29,406	25,201	1,918	5,765	1,655	711	14,444	136,290

36. In Table XXVIII. are given the returns of the acres under various products during the years 1905, 1910, 1915, 1920, 1921, 1922, 1923 and 1924. This consolidated form probably gives a closer insight into the extension or contraction of the cultivation of varied kinds of agricultural products than did the more elaborate ones published in the earlier reports.

TABLE XXVIII.

ACREAGE UNDER CULTIVATION WITH VARIOUS PRODUCTS, 1905 TO 1924.

Counties.	Year.	Nature of Crops and Number of Acres in each of the Years 1905, 1910, 1915, 1920, 1921, 1922, 1923 and 1924.								
		Sugar.	Rice.	Coconuts	Cacao.	Coffee.	Rubber.	Limes.	Maize, Plantains, &c., and Ground Provisions.	Total area under cultivation.
Berbice	1905	18,251	13,721	4,104	2	87	...	...	6,768	42,938
	1910	19,295	12,948	5,009	99	51	30	143	5,932	43,587
	1915	22,102	29,516	7,081	64	40	603	439	5,430	65,275
	1920	19,464	32,401	5,823	86	24	481	398	4,515	63,192
	1921	19,210	23,283	7,002	49	18	545	401	6,112	56,620
	1922	21,073	13,933	5,084	54	11	572	497	4,000	45,024
	1923	19,350	16,460	4,920	161	22	503	324	2,500	44,240
	1924	19,030	15,797	3,648	30	11	40	411	3,311	42,278
Demerara	1905	49,956	5,437	1,647	1,754	224	...	...	10,437	69,456
	1910	46,388	7,429	2,431	1,555	1,941	579	...	9,307	69,630
	1915	47,427	10,400	5,597	1,856	2,620	2,229	61	10,543	80,738
	1920	43,248	14,026	10,738	1,455	2,579	1,246	73	7,004	80,369
	1921	40,378	26,097	12,288	885	2,455	1,196	210	5,791	89,300
	1922	36,868	22,760	11,460	1,080	1,830	650	47	4,980	79,665
	1923	39,080	10,824	10,180	1,497	1,678	561	80	5,290	63,190
	1924	35,155	6,335	14,300	1,630	3,056	1,039	84	6,613	68,212
Essequibo	1905	6,395	4,948	789	227	621	...	...	2,276	15,256
	1910	7,634	8,355	2,123	264	451	311	413	2,230	21,781
	1915	6,933	10,172	5,178	276	1,258	1,233	473	2,266	27,789
	1920	6,818	8,819	7,801	268	1,499	457	525	3,904	30,091
	1921	3,832	6,531	7,031	242	2,557	1,072	491	4,474	26,230
	1922	2,820	12,390	10,059	237	2,400	1,111	116	3,950	33,083
	1923	2,700	7,681	7,870	245	2,396	1,016	396	4,134	26,438
	1924	3,005	7,274	7,253	258	2,698	576	216	4,520	25,809

37. The following are the annual summaries of the total acreages under cultivation during the years 1903, 1908, 1913, 1918, 1919, 1920, 1921, 1922, 1923, and 1924 :—

TABLE XXIX.

ACREAGE UNDER CULTIVATION WITH VARIOUS PRODUCTS.

	Year.	Annual Summaries of the Acreages under cultivation during the years 1903, 1908, 1913, 1918, 1919, 1920, 1921, 1922, 1923 and 1924.								
		Sugar Cane.	Rice.	Coconuts.	Cacao.	Coffee.	Rubber.	Limes.	Maize, Plantains, etc., and Ground Provisions.	Total area under cultivation.
British Guiana	1903	78,860	17,500	3,950	1,530	1,390	...	...	15,748	118,978
do.	1908	74,870	29,746	8,730	2,290	1,502	583	...	20,184	137,905
do.	1913	72,685	33,889	14,177	1,863	3,166	4,018	941	17,580	148,319
do.	1918	73,565	60,432	25,882	1,997	5,158	3,981	1,351	21,959	194,325
do.	1919	70,876	61,400	25,882	2,147	5,125	4,042	1,335	18,192	188,999
do.	1920	69,532	55,246	24,453	1,946	5,052	2,813	1,058	16,583	176,853
do.	1921	63,420	55,911	26,321	1,176	5,030	2,813	1,102	16,378	172,151
do.	1922	60,761	49,073	26,603	1,371	4,241	2,333	660	12,930	157,772
do.	1923	57,814	34,965*	22,970	1,903	4,096	2,080	800	11,924	136,552
do.	1924	57,190	29,406	25,201	1,918	5,765	1,655	711	14,444	136,290

* Rice reaped—Total Spring and Autumn crops ...38,715 acres.

38. In connection with the foregoing returns of area under various cultivations, the following Tables show the average annual acreage and average annual exports of products during successive quinquennial periods and in 1923 and 1924 :—

TABLE XXX.

SUGAR-CANE AND SUGAR.

PERIODS.	SUGAR-CANE.		SUGAR.
	No. of Acres (British) under cultivation.		Tons of Sugar exported.
1859-1863	...	No Records	59,000
1864-1868	...	"	75,330
1869-1873	...	"	81,700
1874-1878	...	"	99,940
1879-1883	...	81,270	103,860
1884-1888	...	80,690	113,820
1889-1893	...	79,630	110,900
1894-1898	...	70,640	101,620
1899-1903	...	74,170	106,260
1904-1908	...	75,580	110,830
1909-1913	...	72,640	94,820
1914-1918	...	76,672	106,980
1919-1922	...	65,020	89,782
1923	...	57,814	83,166
1924	...	57,190	85,896

TABLE XXXI.

COCONUTS, COPRA AND COCONUT OIL.

PERIODS.	No. of Acres (British) under cultivation.	No. exported to nearest hundred.	Copra, lbs.	Coconut Oil, gallons.
1859-1863	...	No records	...	...
1864-1868	...	"
1869-1873	...	"
1874-1878	...	"	1,211,200	...
1879-1883	...	"	866,200	...
1884-1888	...	"	317,400	...
1889-1893	...	"	133,000	...
1894-1898	...	"	4,400	...
1899-1903	...	"	34,800	...
1904-1908	...	7,040	314,400	...
1909-1913	...	12,460	1,034,200	7,500
1914-1918	...	21,014	1,807,500	23,060
1919-1922	...	25,573	2,970,000	20,230
1923	...	22,970	2,659,000	26,621
1924	...	25,201	1,559,800	21,804

TABLE XXXII.

CACAO.

PERIODS.	No. of Acres (British) under cultivation.	Cacao exported lbs.	Raw Cacao and prepared Cacao imported lbs.
1884-1888	...	No records	5,000
1889-1893	...	"	16,000
1894-1898	...	"	84,600
1899-1903	...	"	95,900
1904-1908	...	1,940	73,100
1909-1913	...	2,140	54,500
1914-1918	...	2,114	34,670
1919	...	2,147	9,520
1920-1922	...	2,020	(1920) 24,152
1923	...	1,903	none
1924	...	1,918	"

(1) Including 29,336 of raw cacao.

(2) " 73,950 " "

(3) " 23,596 " "

(4) " 27,940 " "

TABLE XXXIII.

COFFEE.

PERIODS.				No. of Acres (British) under cultivation.	Coffee exported lbs.	Coffee, raw and prepared, imported lbs.
1884-1888	...	...	...	No records	1,640	219,000
1889-1893	...	...	...	"	7,030	250,000
1894-1898	...	...	...	"	5,600	262,700
1899-1903	...	...	...	"	5,580	284,160
1904-1908	...	...	...	1,370	17,900	181,370
1909-1913	...	...	...	2,660	115,200	83,200
1914-1918	...	...	...	4,713	342,190	39,160
1919	...	...	...	5,125	936,540	2,380 (1)
1920	...	...	...	5,032	407,900	7,930 (2)
1921	...	...	...	5,030	405,104	295 (3)
1922	...	...	...	4,240	808,640	1,779 (4)
1923	...	...	...	3,916	535,136	5,248 (5)
1924	...	...	...	5,765	513,072	14,917 (6)

- (1) Including 1,020 lbs. raw coffee.
 (2) " 6,750 lbs. "
 (3) " 24 lbs. "
 (4) " 1,439 lbs. "
 (5) All raw coffee.
 (6) Including 14,620 lbs. raw coffee.

LIVE-STOCK.

39. The returns of the Agricultural Census gives the number of cattle in the Colony as 113,315, of these 54,315 were on the coastlands and 59,000 in the hinterland.

The distribution of live-stock according to the agricultural Census Returns in the Colony is shown in the following Table:—

TABLE XXXIV.

County or District.				1924.				
				Horses.	Mules.	Donkeys.	Cattle.	Buffaloes.
Demerara	...	...	...	452	1,651	2,132	17,932	98
Essequibo	...	...	...	64	127	914	9,504	67
Berbice	...	...	...	280	522	3,122	26,879	4
Hinterland	...	...	...	1,000	9	8	59,000	6
Totals	...	...	...	1,796	2,309	6,176	113,315	175

40. The following Table shows the increases and the decreases in the various kinds of live-stock reported as on the frontlands of the Colony since 1914:—

TABLE XXXV.

	1914.	1916.	1918.	1920.	1922.	1923.	1924.
Horses	1,010	1,016	1,002	941	1,050	800	796
Mules	2,000	2,390	2,359	2,105	1,730	1,790	2,300
Donkeys	6,000	6,466	5,332	7,106	6,160	5,440	6,168
Cattle	79,500	93,264	77,108	85,938	74,350	56,670	54,315
Buffaloes	100	382	176	174	180	264	169
Goats	14,800	14,766	11,236	11,250	8,310	7,940	9,792
Sheep	19,700	22,805	20,611	23,202	16,770	15,130	15,985
Swine	11,600	12,450	12,532	17,401	12,500	11,134	12,589

It is certain that from 1916 the number of cattle on the frontlands and on the northern savannahs has been very materially underestimated by the cattle-farmers and that such supplying of falsified returns has very greatly increased since 1920.

As has been the case for several years the live-stock of the Colony was practically free from infectious diseases during 1924.

41. The numbers of imported male live-stock belonging to the Board of Agriculture on the 1st January and the 31st December, 1924, were:—

TABLE XXXVI.

	BULLS.			RAMS.	Donkeys.	Horses.
	Shorthorn.	Guernsey.	Holstein.	Southdown.		
On hand 1st January, 1924	2	1	...	1	1	1
Imported 1924	...	...	1	...	2	...
Died during 1924	...	1	...	...	...	1
On hand 31st December, 1924	2	1	1	1	3	1

42. The following shows the places where the Board's stallion "Waterbaas" was stationed and the number of services performed by him during the year:—

TABLE XXXVII.

	From	To	No. of services other than to Stud Farm Mares.
Botanic Gardens, Georgetown	3rd January, 1924	29th October, 1924	3

43. The following shows the places where the Board's stallion donkey "Greatland Junior" was stationed and the number of services performed by him during the year:—

TABLE XXXVIII.

	From	To	No. of Services.
Botanic Gardens	1st January, 1924	31st December, 1924	25

44. *Bulls*.—During the year the bulls were stationed as under:—

Guernsey "Rooseveldt II.," Botanic Gardens.

Shorthorn "Duke," H.M. Penal Settlement.

Shorthorn "Francis," Onderneeming and Botanic Gardens.

Holstein "Texas Wonder," Botanic Gardens.

The bulls were not in much demand and during the period under review the fees earned by them amounted only to \$11.40. Many services were given free to Government cows.

Swine.—Owing to there not being any demand for high bred pigs during late years, none have been imported since 1918.

BOARD OF AGRICULTURE.

45. The following were some of the more important matters dealt with by the Board:—

Appointments.—Sir Wilfred Collet, K.C.M.G., and the Hon. C. C. Clementi, C.M.G., M.A., were appointed Honorary Members of the Board; Messrs. E. M. Walcott, F.R., and R. Strang ordinary members; and the Economic Biologist a *ex officio* member.

Deaths.—During the year Mr. John F. Waby, I.S.M., formerly Head Gardener, Botanic Gardens, from 1878 to 1913, and for some years a member of the Board, died.

Licences to kill wild Birds.—Licences to kill wild birds were granted to Viscount Dunsford, Messrs. Manoel A. de Freitas and C. G. Young, and to Dr. H. I. Libby. Permission was granted to Mr. H. L. Humphrys to export six bird skins.

46. *Agricultural Shows.*—The Director of Science and Agriculture, as Chairman of the Board of Agriculture, has at the time of writing this report the following balances with accrued interest in the Post Office Savings Bank in trust for the purpose of County Agricultural Exhibitions :—

County.	Capital.	Interest	Total.
Demerara	\$ 269 05	\$ 8 04	\$ 277 09
Berbice	296 69	8 88	305 57

Shows were held during the year by :—

- (a) The Buxton and Friendship Farmers' Association on the 19th August.
- (b) The West Bank Farmers' Association on the 20th October.
- (c) The Mahaicony Farmers' Association on the 4th November. This was a very satisfactory Show.
- (d) A farmers' competition was held on the East Coast, Demerara, under the auspices of the Victoria-Belfield Agricultural Society.

The following Agricultural Associations were affiliated to the Board for the year 1924 :—

British Guiana Farmers' Conference.
Mahaicony Farmers' Association.
No. 1 Canal Farmers' Association.
No. 2 Canal Farmers' Association.
West Bank Farming Association.
Victoria-Belfield Agricultural Society.
County of Essequibo Agricultural Association.
Beterverwagting and Triumph Farmers' Association.
Buxton and Friendship Farming Association.

Importation of Stock.—During the year the Board imported.—

Two stallion donkeys.
Two blackface Shropshire rams.
One Holstein bull.
Two Holstein heifers.
Eight Plymouth Rock fowls—two cockerels and six pullets.
Four tested queen bees for Onderneeming Farm.

Grading of Rice and Coconuts.—A Joint Committee consisting of representatives from the Board of Agriculture and the Chamber of Commerce reported on the subject of grading rice and coconuts for export, that such grading although desirable is not at the present feasible.

African Oil Palms.—The two lots Nos. 26 and 27 of Plantation Clonbrook planted with African Oil palms were handed over to the Department of Lands and Mines. The growth of these palms has been very far from satisfactory whilst their yields of oil seeds are almost negligible.

Registration of Veterinary Surgeon.—Mr. A. M. Fulton, M.R.C.V.S., was registered as a Veterinary Surgeon.

47. *The Journal of the Board*.—Four issues of the Journal appeared during the year—Volume XVII. Nos. 1, 2, 3 and 4. The circulation of these numbers was :—

		Local.	Foreign.	Total.
January, 1924	...	710	189	899
April, 1924	...	930	191	1,121
July, 1924	...	951	194	1,145
October, 1924	...	931	197	1,128

The cost of publication of these four issues was \$679.64. The popularity of the Journal both in British Guiana and abroad steadily increased.

Wild Birds Ordinance.—A Committee appointed to consider amendments to the Schedules of the Wild Birds Protection Ordinance recommended the following Orders which were adopted by the Board of Agriculture :—

1. "Whereas it is enacted by Section 8 (2) of the Wild Birds Protection Ordinance, 1919, that to the Board of Agriculture may alter the period hereinbefore declared to be the close season and may declare what period shall be the period to be observed as the close season with respect to any or all of the Wild Birds specified or to be specified in the Second Schedule of the Ordinance, the Board hereby declares that the period to be observed as the close season shall be from the 1st April to the 1st August, with the exception of Ibises, (curri-curri and allies) (Ibididæ) for which the close season shall be from 1st January to the 1st August."

"Whereas it is enacted by Section 8 (1) of the Wild Birds Protection Ordinance, 1919, that the Board of Agriculture may from time to time, and as often as occasion may require; by Order declare that the name or names of any bird or birds shall be added to or expunged from the list of birds contained in either of the Schedules to the Ordinance, the Board hereby declares that the following names of birds shall be added to the First Schedule.

"Spur Wings (Parridæ)
 "Storks, (Negro Cop, Heori and allies)
 ". (Ciconiidæ)

"Whereas it is enacted by Section 8 (1) of the Wild Birds Protection Ordinance, 1919, that the Board of Agriculture may from time to time, and as often as occasion may require, by Order declare that the name or names of any bird or birds shall be added to or expunged from the list of birds contained in either of the Schedules to the Ordinance, the Board hereby declares that the following names of birds shall be expunged from the Second Schedule.

"Parrots and Macaws (Psittacidæ)
 "Ducks (Anatidæ)
 "Plovers and Snipes (Charadriidæ)

"and that after the words Pigeons (Columbidæ) the words except in rice fields and their vicinity shall be added."

4. "Whereas it is enacted by section 8 (1) of the Wild Birds Protection Ordinance 1919, that the Board of Agriculture may from time to time, and as often as occasion may require, by Order, declare that the name or names of any bird or birds shall be added to or expunged from the list of birds contained in either of the Schedules to the Ordinance, the Board, after expunging the names of certain birds from the Second Schedule, hereby gives notice that the Second Schedule shall be as follows :—

- "Caraw (Aramidae)
- "Ibis (curri-curri and allies (Ibididae)
- "Maams and Tinamus (Tinamidae)
- "Pigeons (Columbidae), except in rice fields and their vicinity.
- "Powis and Marudis (Cracidae)
- "Spoonbills (Plataleidae)
- "Thick-kneed Plovers (Oedienemidae)
- "Tooth-billed Partridges, (Daraguara and allies Odontophoridae.)
- "Warracabas (Trumpet Birds and allies)
- "(Prophidae.)"

AGRICULTURAL APPRENTICES.

48. On January 1st, 1924, there were sixteen apprentices, and one journeyman. As these were in excess of the accommodation probationers were not admitted during the year. One journeyman, Mr. John Mc. Kenzie Crawford, left the colony on the 19th April, 1924, to take up an appointment in Africa.

Nine apprentices completed their indentures during the year; of these, two became journeymen and remained at the Botanic Gardens, one was appointed Clerical Assistant at the Botanic Gardens, four left to seek employment elsewhere and two were dismissed for deliberate disobedience.

Certificates of competency were handed to the following five apprentices by His Excellency the Governor at the meeting of the Board of Agriculture held in the Court of Policy Hall during the period under review :—

Kenneth Wallingford Liverpool.
 Walter Alonza Scott.
 Patrick Benjamin Franklin.
 Kinsell Christopher Jerrick
 Lindon Hobland Hope.

The number of lads in training at the Botanic Gardens and Experimental Fields on the 31st December, 1924, was nine—two journeymen and seven apprentices.

The total expenditure on the apprenticeship scheme during the year amounted to \$3,299.11 as compared with \$4,609.54 in the previous year. Of the expenditure in 1924, \$1,058.84 and \$793.62 were recouped respectively as the value of the labour of the lads and as payment from them for their dietaries, thus reducing the cost of the scheme to \$1,446.65.

The work done by the apprentices showed signs of general improvement, and the duties that they were called upon to perform were carried out satisfactorily.

DISTRICT GARDENS.

49. The following seven Gardens have been in operation since 1915; the attendances in 1920, 1921, 1922, 1923 and 1924 being :—

TABLE XXXIX.

	1920.	1921.	1922.	1923.	1924.
Bourda, Georgetown ...	6,285	5,671	3,557	4,038	4,123
Houston, East Bank, Demerara ...	3,228	2,539	1,516	2,137	2,146
Belfield, East Coast, Demerara ...	2,312	1,968	1,841	2,780	2,827
Den Amstel, West Coast, Demerara ...	2,532	2,049	1,525	1,953	1,678
Stanleytown, New Amsterdam, Berbice...	1,665	1,642	1,510	1,595	1,103
Wakenaam, Essequibo ...	2,148	1,610	1,397	1,951	1,664
Suddie, Essequibo ...	2,525	2,629	1,593	1,934	1,789
Total attendances	20,695	18,108	12,944	16,393	15,330

The numbers of attendances were not satisfactory although the District Gardens have greatly improved and good work is being done in them.

The costs of the maintenance of the Gardens during 1924 were \$1,555.94 as compared with \$1,511.79 in 1923.

DISTRICT AGRICULTURAL INSTRUCTORS.

50. The following are the part time District Agricultural Instructors:—

Mr. J. M. Antrobus—West Bank, Demerara River, and Canal Polder District.

Mr. C. Humphreys, East Bank, Demerara River District.

Mr. J. E. Wilson—Essequibo Islands District.

Mr. R. R. Pasea—Essequibo Coast District.

Mr. D. D. Haynes—Mahaica-Mahaicony District.

Mr. J. M. Cush—Berbice River District.

Mr. R. R. Ross—West Coast, Berbice District.

Mr. T. A. Archer—Parika and Leguan District.

Mr. D. W. Fingal—Corentyne District.

The vote for District Agricultural Instructors for 1924 was \$6,636. The majority of the instructors show much interest in their work, the results of which should in time prove beneficial to the smaller farmers.

THE GOVERNMENT CHEMICAL LABORATORY.

51. During the year six thousand four hundred and forty-six samples were sent officially for analysis by various departments and authorities.

Useful work was done under the Food and Drugs Ordinance, three thousand six hundred and eighty samples having been analysed of which three hundred and six were returned as adulterated, equivalent to a percentage of 8.3. This shows that the rates of freedom from adulteration found among the samples received including milk, were satisfactory.

During the period under review the fines inflicted by the Magistrates for breaches of the Ordinance amounted to four thousand six hundred and twenty-one dollars and eighty-six cents. Milk vendors alone were responsible for four thousand five hundred and twenty dollars and forty-two cents. The fines for adulterated samples taken on Sundays and Public Holidays amounted to one thousand five hundred and eighty-six dollars and sixty-six cents.

There were 23 manufactories of Aerated Waters at work in the Colony during 1924, the equipment and the products of which are controlled by this Department by virtue of clause 12 of the Sale of Food and Drugs Ordinance, 1918. The various factories have been repeatedly inspected during the year and are all in good condition, several of them being remarkable for the excellent sanitary conditions under which they are working and for the high quality and purity of their products. It is, however, to be regretted that several of these factories persist in the abuse of saccharine in place of pure sugar syrup, for sweetening their "soft drinks."

BOTANIC GARDENS.

52. The report of the Superintendent shows that the Botanic Gardens have received careful attention during the period under review. They were in a very satisfactory condition except for the prevalence of the pest *Antedesma venosum*.

In July 1904 a packet of seeds of *Antedesma venosum* was received from the Botanic Gardens, Durban, Natal, no indication being given to us that such seeds were seeds of one of the most destructive pest-plants in the world. In complete ignorance of the character of this plant, the then Government Botanist, Mr. A. W. Bartlett, allowed the late Head Gardener Mr. Waby to raise plants from them and to set out

the young plants in various parts in the Gardens. These plants first flowered and fruited in 1907. The Head Gardener found that the fruit was edible and capable of being made into a jam. He appears to have extended the cultivation of the plant. A further supply of these seeds were received from Botanic Gardens, Durban, in August 1912, but the very rapid extension of the plant in the Botanic Gardens had by then received attention. In 1915-1916 the Botanic Gardens authorities realised that a most serious pest had been introduced into the Botanic Gardens. Attention was drawn to this not only in the annual reports but at meetings of the Board of Agriculture and gardeners, planters and farmers were warned to guard against the introduction of weed into their cultivations. It has since proved practically impossible to control its extension in the Botanic Gardens, where it would now require an expenditure of many thousands of dollars in an endeavour to eradicate it. Everything we could think of has been done with the object of restricting its spread but this is a matter of the utmost difficulty as birds feed on its fruit and hence spread its seeds, whilst it extends by means of roots of very great length, often in excess of 50 feet, which throw up shoots wherever they traverse land which is not thickly covered with grass. It has now spread to the La Repentir Cemetery, to various fields in the vicinity of the Botanic Gardens, to Sophia Sugar Experiment Station and to Plantation Ogle. All that we have been able to learn about it from Natal is that it is a pest impossible to control and that it has destroyed there many thousand acres of pasture land.

The various minor gardens in Georgetown were well looked after during the year, and were in good order.

The New Amsterdam Garden was kept in excellent order during the year.

The Municipal Gardens, Georgetown, were maintained in good order under the supervision of the skilled horticulturists of this Department.

There was a marked increase in the demand for plants of economic importance, 4,990 cacao, coffee and other plants of economic value being sold during the year as compared with 3,512 in 1923. The revenue from sales of economic plants at the Botanic Gardens including the receipts for the sale of 12,246 lbs. of seed padi, 5 white Leghorn fowls and 856 eggs, was \$496.07. The receipts for ornamental plants, flowers, etc., amounted to \$547.62.

I have the honour to be,

Sir,

Your obedient Servant,

J. B. HARRISON,
Director.

The Honourable
THE COLONIAL SECRETARY,
1st September, 1925.

REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31st DECEMBER, 1924.

APPENDIX I.

REPORT OF THE GOVERNMENT ANALYST.

APPENDIX I.

REPORT OF THE GOVERNMENT ANALYST FOR THE YEAR ENDED
31st DECEMBER, 1924.

SIR,

I have the honour to report that during the year under review six thousand five hundred and fifty-five samples were received at the Government Laboratory for examination. In the preceding year six thousand six hundred and twenty-six samples were received.

2. Six thousand four hundred and forty-six of the samples were sent officially by various Departments and Authorities and were received from the following:—

1. The Comptroller of Customs	...	1,878
2. The Inspector General of Police	...	2,279
3. The Chief Commissary	...	243
4. The Government Medical Officer of Health	...	592
5. The Municipal Medical Officer of Health	...	562
6. The Chairman, Poor Law Board	...	14
7. The Director, Public Works Department	...	1
8. The Director, Science & Agriculture	...	56
9. The Surgeon General	...	3
10. The Medical Officer—Infant Welfare & Maternity Clinic...	...	12
11. The Resident Surgeon, Public Hospital	...	4
12. The Board of Agriculture	...	802
		<hr/> 6,446 <hr/>

3. The number of private samples analysed was one hundred and nine.

4. The following is an abstract of the numbers of official samples submitted to the Government Laboratory since its re-establishment in 1879:—

1880	...	70
1890	...	900
1900	...	3,486
1910	...	4,464
1920	...	3,878
1921	...	4,385
1922	...	5,066
1923	...	6,457
1924	...	6,446

5. The samples received during 1924 may be classified as under:—

1. Viscera (including suspected poisoning)	...	3
2. Food & Drink (sent for fiscal purposes)	...	282
3. Food and Drink (sent for non-fiscal purposes)	...	3,429
4. Petroleum. Petrol, etc.	...	173
5. Drugs, Oils, Varnishes, etc	...	122
6. Tobacco (fiscal)	...	445
7. Sugar and Molasses	...	24
8. Manures	..	1
9. Soils...	...	10
10. Waters	...	19
11. Malt Liquors	...	3
12. Aerated Drinks (including materials for making same)...	...	42
13. Hydrometers, Polariscopes & Thermometers	...	176
14. Wines and Liqueurs	...	682
15. Spirits (Customs Department)	...	151

16. Coloured Rum, Colouring matter, Sediment (Excise Department) ...	41
17. Illicitly Distilled Spirits ...	14
18. Bitters and Cordials ...	10
19. Methylated Spirits (and materials for making same) ...	53
20. Rocks & Minerals (including Bauxite) ...	27
21. Opium ...	3
22. Sugar Canes (Sophia Experiment Station) ...	802
23. Bay Rum ...	25
24. Miscellaneous ...	18
Total ...	6,555

6. *Substances including Viscera suspected to contain Poison*:—Three cases of alleged poisoning entailing the examination of seven exhibits were reported on during the year under review.

The following table illustrates the position regarding such work during the years 1911–1924 :—

YEAR.	NUMBERS.				POISONS DETECTED.													
	Cases investi- gated.	Deaths.	Exhibits sub- mitted.	Cases in which poisons were found.	Tartar Emetic.	Ground glass.	Strychnine.	Arsenic.	Datura (Atropine).	Potassium Cyanide.	Corrosive Sublimate.	Opium.	Carbolic acid.	Sulphuric acid.	Nicotine.	Morphia.	Mercuric Iodide.	Mercury (in fine state of divi- sion).
1911.	4	0	6	3	1	...	1	1	...	...	...	...	...	...	...	...	...	...
1912.	5	1	10	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...
1913.	5	3	9	4	1	...	1	...	...	1	1	...	...	...	...	...	...	...
1914.	5	2	34	3	...	...	...	...	...	...	1	2	...	...	...	...	...	...
1915.	6	3	13	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...
1916.	4	2	9	2	...	...	1	...	...	...	...	...	1	...	...	...	...	...
1917.	6	7	1	1	...	...	...	...	1	...	...	...	1	...	...	...	...	...
1918.	2	2	5	2	...	...	...	...	...	1	1	...	...	...	1	...	...	...
1919.	3	2	3	2	...	...	...	1	...	1	...	...	...	...	...	...	...	...
1920.	6	1	9	2	...	...	...	...	...	1	1	...	...	...	...	1	...	...
1921.	11	3	31	7	...	...	1	...	...	1	...	2	1	1	...	...	1	...
1922.	8	1	15	6	...	1	...	...	1	...	2	...	1	1	...	...	...	...
1923.	4	2	12	3	...	1	...	...	...	...	1	...	...	...	...	...	...	1
1924.	3	1	7	3	...	...	...	...	1	...	2	...	...	...	...	...	...	...
	72	23	170	40	2	2	4	2	4	3	9	5	3	2	1	1	1	1

As will be seen from the above table there was a further decrease in cases of suspected poisoning in the Colony as compared with the previous three years. During the year one person died of corrosive sublimate (mercuric chloride) poisoning.

7. *Articles of Food and Drink*.—Three thousand six hundred and eighty samples of food and drink other than spirituous liquors submitted for examination for non-fiscal purposes were examined under the Sale of Food and Drugs Ordinance. Of these 306 were returned as adulterated, this being at the rate of 8.3 per cent. There has been a slight increase in the rate of adulteration of milk as shown by the following table :—

Year.	Samples submitted.	Per cent. returned as adulterated.		
		All Samples.	Milk Samples.	Samples other than Milk.
1894	308	54.5	42.1	60.6
1904	904	24.5	26.0	7.5
1914	1,189	18.4	12.8	16.5
1915 (9 months)	1,320	17.7	18.2	16.0
1916	1,917	16.9	13.2	12.5
1917	1,727	14.8	15.4	6.0
1918	1,818	14.6	15.4	6.2
1919	1,792	11.8	12.1	9.5
1920	1,898	18.1	19.7	8.1
1921	2,955	8.7	9.6	8.0
1922	3,964	8.4	8.6	5.2
1923	4,101	7.0	7.4	3.8
1924	3,680	8.3	8.8	3.4

The articles examined during the year under review were as follows :—

Nature of Foodstuff examined.	No. examined.	Returned as adulterated.	
		Number.	Per cent.
Milk	3 302	293	8.8
Butter	104	2	1.9
Ghi and Phalkaghi...	71	5	7.0
Olive Oil	22	1	4.5
Coffee	35	...	...
Vinegar	105	5	4.7
Soda Water	13	...	...
Ginger Beer	...	...	...
Lemonade	26	...	...
Mauby	...	...	...
Camphorated Oil	2	...	...
Totals	3,680	306	8.3

The above table shows that the rates of freedom from adulteration found among the samples received, including milk, were satisfactory.

During the period under review the fines inflicted by the Magistrates for breaches of the Ordinance amounted to four thousand six hundred and twenty-one dollars and eighty-six cents. As in previous years the greater number of convictions were for the sale of adulterated milk, and the fact that the vendors of such milk pay the heavy fines inflicted and continue in their occupation shows the very profitable nature of their fraud, a fraud fraught with danger to consumers of milk, especially infants and sick persons. It is evident that only by the constant and stringent administration of the Sale of Food and Drugs Ordinance can the sale of adulterated milk be kept under satisfactory control. The profitable nature of the frauds of removing butter fat from the milk and by adding water to it is shown by the fact that during the year under report the vendors of sophisticated milk were able to pay four thousand five hundred and twenty dollars and forty-two cents. The fines for adulterated samples taken on Sundays and Public Holidays amounted to one thousand five hundred and eighty-six dollars and sixty-six cents.

8. Eighty-five samples of petroleum for illuminating purposes were analysed under the petroleum and Inflammable Liquids Ordinance, 1916, for the Comptroller of Customs, and were all found to be above the legal standard (Abel Pensky, 85 degrees Fah.). Three samples of petroleum were received from the Inspector General of Police, the flash points of which were found to be below the legal standard. These latter were reported as "Dangerous Petroleum" under Ordinance 20 of 1916.

9. *Drugs, Oil and Varnishes, etc.*—Of these thirty medicinal tinctures were submitted for analysis to determine the percentage of alcohol present and their correspondence to the limits of the British Pharmacopia.

10. *Wines, Spirits and Liqueurs*.—Eight hundred and thirty-three samples of imported wines, spirits and liqueurs were examined to determine their alcoholic strength. Forty-one samples of rum, sediment from rum vats, wash and colouring matter were similarly submitted. Fourteen samples of spirits suspected to be the produce of illicit stills were examined to determine their nature and were regarded as “Bush Rum.”

11. *Hydrometers, Polariscopes and Thermometers*.—One hundred and seventy-two hydrometers used for excise purposes have been compared with the standard instrument generally with satisfactory results. Two polariscopes were standardised, and two thermometers were tested and the corrections given.

12. *Opium*.—Three samples alleged to contain opium were sent for examination on account of a suspected breach of the Opium Ordinance.

13. *Aerated Waters*.—Thirty samples of aerated waters and mauby were examined under this Ordinance. There has been a great improvement in the quality of the locally made aerated waters due to the conditions prescribed by the Governor-in-Council as to the working and otherwise of manufactories of aerated or artificial mineral waters. These conditions are cited as the Aerated Waters Manufactory Conditions, 1923, and are under section 12 (1) of the Sale of Food and Drugs (Consolidation) Ordinance, 1918. All the aerated water factories now have efficient means of filtering the water used in the preparation of the various drinks.

14. *Sugar Canes*.—Eight hundred and two were examined as compared with five hundred and seventeen in the preceeding year.

15. *The Receipts of the Laboratory*.—During the period under review the receipts of the Laboratory from the fees paid into the Treasury by private persons and fines for examinations made for them amounted to two hundred and thirty-two dollars and fifty cents. The Treasury also received four thousand six hundred and twenty-one dollars and eighty-six cents as fines inflicted under the Sale of Food and Drugs Ordinance, the total receipts due to the work of the Laboratory thus amounting to four thousand eight hundred and fifty-four dollars and thirty-six cents.

W. FRANCIS,
Deputy Government Analyst.

THE DIRECTOR OF SCIENCE AND AGRICULTURE.

REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31ST DECEMBER, 1924.

APPENDIX II.

REPORT ON THE BOTANIC GARDENS AND THEIR WORK.

APPENDIX II.

BOTANIC GARDENS,
GEORGETOWN, DEMERARA,
28th February, 1925.

SIR,

I have the honour to submit the following report on the working of the Botanic Gardens in Georgetown and the Public Gardens in New Amsterdam, Berbice, for the year ended 31st December, 1924.

BOTANIC GARDENS, GEORGETOWN.

Ornamental Section.

2. The average number of regular labourers employed during 1924 was 40, This does not include extra hands taken on when urgent works had to be done, such as burning earth, digging trenches, etc. During the year a considerable number of applications were received for employment but the applicants almost invariably refused to work for the pay offered. With few exceptions, however, the same employees were regularly employed throughout the year. The amounts expended under the voted sub-heads for the year were:—

Botanic Gardens Maintenance	...	...	\$4,958 50
Irrigation and Drainage	...	...	747 67
Purchase, production and distribution of seeds and plants	...	...	2,491 20
Carts, Harness, Tools and Implements	...	...	515 63

3. One consignment of seeds was received during the year, comprising both vegetable and flower. These were distributed to the various gardens including the District Agricultural school gardens.

4. During the year no plants were received from abroad.

5. The following is a list of trees which flowered during the year under review and the months of their flowering:—

Erythrina indica, *Melaleuca Leucadendron*, *Brownea rosea*, *Jacaranda ovalifolia*, *Gliricidia maculata*, *Cordia alba*, *Lagerstræmia Flos-reginae*, *Mimusops globosa*, *Acacia arabica*, *Lonchocarpus violaceus* (January). *Kigelia pinnata*, *Barringtonia racemosa*, *Triplaris surinamensis*, *Leptospermum pubescens*, *Erythrina indica* var. *alba*, *Spathodea campanulata*, *Peltophorum ferrugineum* (February). *Rhus rufa*, *Platymiscium platystachyum*, *Eugenia magnifica*, *Acacia Smithiana*, *Pachira aquatica*, *Sterculia foetida*, *Poinciana regia*, *Erythrina vlissegensis*, *Mangifera indica*, *Cassia grandis*, *Cassia javanica*, *Bombax Ceiba*, *Carapa guianensis*, *Pithecolobium Saman*, *Caesalpinia paucijuga*. (March). *Acacia arabica*, *Erythrina glauca*, *Tecoma spectabilis*, *Swietenia macrophylla*, *Myroxylon Pereirae*, *Cordia alba*, *Kigelia pinnata*, *Gliricidia maculata*. (April). *Albizia Lebbek*, *A. procera*, *Azalia spicata*, *Terminalia Arjuna*, *Tecoma spectabilis*, *Cassia calliantha*, *Monodora tenuifolia*, *Mangifera indica*, *Atalantia monophylla*, (May). *Jacaranda ovalifolia*, *Musa Ensete*, *Leptospermum pubescens*, *Sterculia carthaginensis*, *Sterculia rupestris*, *Cassia siamea*, *Lonchocarpus latifolius*, *Peltophorum ferrugineum*, (June). *Melaleuca Leucadendron*, *Spathodea campanulata*, *Pachira aquatica*, *Lagerstræmia macrophylla*, (July). *Acacia arabica*, *Dillenia speciosa*, *Swietenia macrophylla*, *Pterospermum semi-sagittatum*, *Cassia calliantha*, *Sterculia carthaginensis*, (August). *Acacia arabica*, *Caesalpinia paucijuga*, *Triplaris surinamensis*, (September). *Andira inermis*, *Mangifera indica*, *Barringtonia racemosa*, *Melaleuca Leucadendron*, (October). *Jacaranda ovalifolia*, *Brownea rosea*, *Myroxylon Pereirae*, *Petreaea arborea*, *Eucalyptus alba*, *Erythrina Corallodendron*, (November). *Erythrina Crista-galli*, *Spathodea campanulata*, *Lagerstroemia Flos-reginae*, (December).

6. The following are the palms which flowered during the year :—

Lodoicea sechellarum, *Nephrosperma ran-Houtteana*, *Calamus Jenkinsianus*, *Chrysalidocarpus lutescens*, (January). *Pinanga Kuhlîi*, *Maximiliana regia*, *M. caribaea*, *Pritchardia pacifica*, *Sabal mauritiiforme*, *Thrinax parviflora*, *Phoenix dactylifera*, *Licuala grandis*, *Caryota Lowii*, (February). *Bentinckia nicobarica*, *Bactris Plumeriana*, *Attalea speciosa*, *Astrocaryum aureum*, *Archontophoenix Cunninghamii*, *Dictyosperma rubrum*, *Phoenix sylvestris*, *P. paludosa*, *Sabal Blackburnianum*, *Livistona australis*, (March). *Sabal minor*, *Calypstrogyne Swartzii*, *Cocos amara*, *Caryota mitis*, (April). *Cocos schizophylla*, *C. plumosa*, *Stevensonia grandiflora*, *Attalea spectabilis*, *Caryota urens*, *Heterospathe elata*, *Acanthorhiza aculeata*, *Latania Cernmersonii*, *Serenoa serrulata*, (May). *Caryota Lowii*, *Hyophorbe amara*, *Dictyosperma fibrosum*, *Livistona altissima*, *Latania Loddigesii*, *Thrinax parviflora*, (June). *Maximiliana regia*, *Copernicia cerifera*, *Hydriastele Wendlandiana*, *Cocos plumosa*, (July). *Euterpe Jenmanii*, *E. edulis*, *Geonoma baculifera*, *Dypsis madagascariensis*, *Diplothemium caudescens*, *Ptychoraphis angusta*, *Pritchardia pacifica*, (August). *Ptychosperma Macarthurii*, *Pinanga Kuhlîi*, *Phoenix rupicola*, *P. humilis*, *P. paludosa*, *Latania Loddigesii*, *Sabal mauritiiforme*, *S. mexicanum*, (September). *Mauritia flexuosa*, *Licuala peltata*, *L. Rumphii*, *Livistona Hoogendorpii*, *Thrinax argentea*, (October). *Washingtonia filifera*, *Veitchia Joannis*, *Kemia Forsteriana*, *Calamus periacanthus*, *Corypha umbraculifera*, (November). *Attalea Cohune*, *H. speciosa*, *Hyophorbe Verschaffeltii*, *Dictyosperma album*, *Dypsis madagascariensis*, *Phoenix rupicola*, *P. sylvestris*, (December).

The following palms suffered from the drought seasons experienced during the year :—

Pinanga Kuhlîi, *Chrysalidocarpus lutescens*, *Euterpe edulis*, *Licuala grandis*, *Nephrosperma ran-Houtteana*, *Cyrtostachys crenda*, *Bentinckia nicobarica*, *Thrinax radiata*.

The following palms died during the year :—

Licuala grandis, *Phoenix tenuis*, *Thrinax argentea*, *Washingtonia filifera*, *Oreodoxa regia*.

Two young seedlings of the double coconut palm *Lodoicea sechellarum*, were planted this year. Two of these seedlings were planted out in 1923. These were planted in No. 1. island. Those planted out in 1924 were planted on the northern end of the centre bed near where one was planted in 1923. The other was planted on the western border on the same island. This makes three plants on this island. The one planted on the northern end of the centre bed, one of a twin seed, was fertilized on 1st September, 1916, sown on 13th November, 1922, germinated 28th April, 1924, and planted out 1st October, 1924. The other planted on the western border was fertilized 15th June, 1916, sown 8th June, 1922, germinated 10th January, 1924 and planted out 1st October, 1924. The young seedlings grow very slowly producing one leaf a year. The parent plants flowering and fruiting in the Calabash Walk form a special attraction to visitors.

7. *Orchids*.—These have suffered a good deal during the year and several of the weaker plants have died. They require rebasketing. The *Dendrobiums* grow vigorously without any care, but unfortunately produce few flowers. These have been treated in various ways in order to get them to flower but without avail. *Cattleyas* and *Phalaenopsis* make the best show. Many of the commoner kinds such as *Gongoras*, *Brassias*, *Epidendrums* and *Oncidiums* are of considerable interest and flower freely, but are not as attractive as the *Phalaenopsis* or *Cattleyas*. The following list shows the months during which the more striking ones flowered :—

Cattleya labiata, *Oncidium lanceanum*, *Gongora nigrita*, *G. atropurpurea*, *Rodriguezia secunda*, *Epidendrum ciliare*, *Brassia caudata* (January). *Cattleya specios-*

issima, *C. Trianaei*, *Dendrobium Gibsonii*, *Phalaenopsis amabilis*, *Epidendrum fragrans*, (February). *Catasetum tridentatum*, *Brassia Lawrenceana*, *Ornithidium album*, *Gongora nigrita*, *Cattleya Skinnerii*, *Dendrobium superbum*, *Phalaenopsis Stuartiana*, *Vanda suavis*, *Epidendrum variegatum*, *Cymbidium pendulum* (March). *Cattleya superba*, *Cattleya imperialis*, *C. labiata*, *C. Schroederiana*, *Sobralia sessilis*, (April) *Cattleya Bowringiana*, *C. Gaskelliana*, *C. Mossiae*, *Epidendrum nocturnum*, *Dendrobium nobile*, *Vanda teres*, *Phalaenopsis Esmeralda*, *Cattleya Jeannanii*, *Laelia tenebrosa*, *Aerides odoratum*, *A. Lobbii*, *A. crassifolium*, *Renanthera coccinea* (June). Most of these flowered a second time between July and December.

8. *Climbing plants*.—No new additions were made to these during the year. The most striking of those that flowered were:—

Bauhinia Vahlii, *Bignonia magnifica*, *Beaumontia grandiflora*, *Bougainvillea glabra*, *B. lateritea*, *Banisteria ciliata*, *Porana volubilis*, *Dipladenia Harrisii*, *Antigonon insigne*, *Derris scandens*.

9. *Herbaceous plants*.—The primrose *Asystasia coromandeliana* made a fine display during the year especially in February, March, and April, in the Park Lands and avenues. Along with these were also seen *Sagittarias*, *Crinums*, *Heliconias*, etc.

10. *Aquatic plants*.—No new additions were made to the collection of these during the year. The lakes and trenches were cleaned at intervals. The two cross canals containing the Purple and Pink Nymphaeas have been carefully watched to prevent the more vigorous growing aquatics, such as *Cabomba aquatica*, aquatic grasses, *Luziola spruceana* and the vigorous growing white flowered Nymphaea, taking over the weaker kinds. This white flowered Nymphaea, *N. dentata*, has now become a pest and would soon kill out the weaker kind if allowed to spread. It has now practically taken over the entire south side line draining trench from the Vlissengen road to the experimental fields—a distance of a mile in length. It is a fine sight when seen in the early morning when the canal is literally covered from side to side with beautiful white nymphaea lilies. The *Victoria regia* seedlings growing in Lake No. 4, referred to in my last year's report, have not recovered from the effect of the salt water that got into this lake from the town trenches. The *Nymphaeas* and *Nelumbiums* in the lakes and trenches make a good display during the year, the latter being in great demand for decoration purposes.

11. *Noxious weeds*.—The *Antidesma venosum* referred to in previous reports continues to give serious trouble where it has taken a strong hold. Its vigorous rapid growth gives the Park Lands an unsightly abandoned appearance. If when the bushes are being dug out small fragments of roots are left in the ground these fragments will grow. With such a vigorous growing bush other means of killing it are desirable. Other methods were devised as follows:—

Two clumps of stems 10 feet in diameter each received 50 lbs. of common coarse salt. No. 1 clump of stems was cut down close to the ground while No. 2 was left standing with stems 3 to 4 feet high. The salt was spread throughout the centre of the clump, slowly dissolving and soaking into the soil. Three weeks afterwards the lower leaves on the stems in No. 2 clump began to turn yellow and to drop. The tips of the shoots kept their leaves on. No. 1 clump after two months, began to grow as before. This experiment so far proved a failure. Another experiment that is under trial and which shows some promise was as follows:—

The stems of one of the vigorous growing clumps was cut off close to the ground with a cutlass, and the surface of the clumps covered over to a depth of 2 to 3 feet thick with ordinary scythed grass cut near by. So far none of the young shoots have made their appearance. It should be noted that this experiment was begun late in October last. If this method of smothering succeeds as it would appear it will do, it will be a simple and comparatively easy and economical way of keeping

this troublesome pest under control ; but the young shoots will have to be carefully watched and kept completely smothered under for some considerable time until the strong vigorous roots die. At the time this experiment was made, another strong growing clump near by was also cut off close to the ground but not covered with grass, this has produced a dense cluster of stems now 4 feet high. This will give some idea of the rapid rate of growth of this troublesome bush.

12. *Lawns and Borders*.—These have received the usual attention. The lawns have been regularly mowed and kept in fair order. The following number and kinds of plants were planted out in these gardens ; in Georgetown :—Annuals 8,754 ; Herbaceous 2,066 ; Perennials 1,600 ; Shrubs 964 ; Trees 17 ; Palms 26.

Amongst the palms planted were two *Lodoicea sechellarum*, in No. 1 Island, already referred to.

13. *Militia Band performances on Sundays*.—The following shows the number of visitors who visited the gardens on the Sundays when the British Guiana Militia Band performed (*i.e.*, every 2nd Sunday in every 2nd month) :—

FEBRUARY, 1924.

44	Motor Cars containing...	...	187 persons.
3	Carriages	" ... "	10 "
	Cyclists	...	185 "
	Pedestrians	...	1,861 "
Total...			<hr/> 2,243 <hr/>

DECEMBER, 1924.

60	Motor Cars containing...	...	300 persons.
4	Carriages	" ... "	12 "
	Cyclists	...	106 "
	Pedestrians	...	665 "
Total...			<hr/> 1,083 <hr/>

From April to October the Band was at the British Empire Exhibition at Wembley.

14. *Roads and Paths*.—In my last year's report I mentioned that several of the roads and paths required raising throughout. Considerable repairs were made to the Serpentine drives, Upper Avenue Road, Nursery road and paths, and the south side-line general heavy traffic road leading to the nursery and cow-byre. During the year two medium-sized heaps of earth were burnt for road material. No new paths or roads or alterations to existing ones were made.

The length of the Central Avenue of the Botanic Gardens east of the Oval is 367 rods or about 1,510 yards. This Avenue consisted originally of Oronoque trees planted in single rows on both sides of the road with the trees $2\frac{1}{2}$ rods apart and thus contained 294 trees. Probably prior to the death of the former Superintendent of the Botanic Gardens, the late G. S. Jenman, about 30 of these trees either had fallen or had to be felled on account of their dangerous condition, leaving here and there unsightly gaps in the Avenue. Since his death the Oronoque trees have continued to die out, some of them have had to be felled while many of them fell. Only 23 trees remain at the time of writing ; that is 92% of the trees of the original Avenue are no longer in existence. Very great attention has been paid to replacing the fallen Oronoque trees by other trees, but although the Avenue is universally recognised as still being a very handsome one it cannot compare for general landscape and gardening effects to what it was at the commencement of this century.

15. *Nursery and Nursery Buildings*.—The usual routine work of propagating was carried on. There was a slight increase in the demand for economic plants, such as cacao, coffee and other economic plants and rice padi. The usual quantity of plants for decoration purposes was kept in stock. Of the large additional number got together for the British Empire Exhibition at Wembley the following were sent :—

Palms 92, Cycads 3, Ornamental Shrubs 59, Economic plants 33, Sugar Cane growing in tubs 7, Fibre-producing plants 13, Total 207.

When the palms were unpacked in England they presented an appearance of fair promise, but soon after their arrival the large coconut palms completely failed. They evidently had not had sufficient time to establish themselves in the tubs before shipment. The large cabbage palms also succumbed, no doubt for the same reason. Cycads and *Rhapis flabelliformis* were successful, but the shrubs and economic plants had not properly recovered for any effective purpose during the time the Exhibition remained opened; although they had been kept in the Royal Botanic Society Gardens, Regent Park, in hot houses. In August, however, some sugar canes recovered producing excellent stools of young growing sugar canes. Fibre plants, (*Agaves*), etc., were the hardiest of the collection and travelled successfully. Mr. A. A. Abraham, Horticultural Superintendent, who had attended the Exhibition and in whose charge they were, in his report, is of opinion that, were the plants shipped the previous summer their efforts of planting an effective and attractive Tropical Garden at Wembley would have met with much greater chances of success during the period of the Exhibition. No repairs to the Nursery buildings were required during the year.

16. *Islands No. 3 and 6*.—The haunts of the Egrets, Herons and Hawks are full of interest to visitors, especially to strangers to the Colony. During the breeding season hundreds of young birds can be seen perched on the trees and running about the lawns and by the sides of trenches apparently in search of small fishes.

17. *Irrigation and Drainage*.—The irrigation canals have received general attention. The "Bull Dog" oil engine put down by the Public Works Department five years ago continues to give satisfaction. The main draining trench in front of the Gardens from the Vlissengen bridge to the Lamaha pumping station, several rods of the north side-line draining trench going east and the south side-line draining trench from the Vlissengen bridge to the Nursery gate were dug. A good deal of this soil was used for burning earth and a quantity given to the recreation ground of the Girl Guides for raising and levelling. The recreation ground is the eastern portion of the Brickdam Experimental Field. The Public Works Department made a concrete groove on the eastern end of the bridge where a greenheart plank can be slipped into and taken out as required and so prevent salt water backing up into the gardens when the town canals are periodically flooded.

18. *Shelter Belt and D'Urban Park*.—The former is situated along the northern side of the gardens. It received the usual attention. The avenue of Saman trees, *Pithecolobium Saman*, in the D'Urban Park is making satisfactory progress. This Park is now being used for breeding and rearing horses for police remounts. It now drains eastwards towards the cross trench that drains into the Botanic Gardens south side draining trench. Formerly this field used to drain this way as well as through an old wooden box koker running across the Vlissengen road at the top of Brickdam and entering into the northern draining trench of the Brickdam; this koker had got into a very dilapidated condition. It was removed and the area filled in with earth. The ground of the compound and around the buildings has been made up and a kraal built to facilitate rounding up the animals when required to be caught.

19. *Coffee*.—There was an increase in the demand for coffee plants this year compared with the previous year. In 1924 the number sold was 736, in 1923 the number was 289. All of these plants were the Liberian variety.

Cacao.—The demand for Cacao was also slightly on the increase. In 1924 one thousand nine hundred and thirty were sold. In 1923 one thousand four hundred and ten were sold.

Other Economic Plants.—The demand for these were also slightly on the increase this year, about six hundred more plants having been sold. Included in these were six hundred banana suckers.

20. The number of fruits borne by the different varieties of mango trees growing in the nursery was as follows:—

Varieties.	No. of trees.	No. of fruits.
Jamaica No. 11. ...	5	1,888
Ceylon No. 1. ...	6	1,714
Mrs. White ...	3	982
Canal No. 1 ...	4	831
D'Or ...	2	820
Julie ...	6	738
Dr. Rowland ...	6	700
Colonial Bank ...	2	656
Mrs. Dare ...	3	514
Chinoise ...	3	503
Imperial ...	1	446
E. I. Seedling ...	1	360
Bombay Purple ...	3	332
Divine ...	2	289
Mrs. Francis ...	1	286
Gordon ...	1	276
Bombay Yellow ...	1	226
Pere Louis ...	1	197
Sabot ...	1	173
Reynaud ...	1	168
Josephine ...	1	166
Martin ...	2	165
Bombay 25 ...	1	160
Bombay 27 ...	1	126
Martinique D'Or ...	1	120
Pt. D'Or ...	1	87
Princess Marie Louise ...	1	25

A large number of the fruits were attacked by a fungus, *Gloeosporium mangiferae*, which made them unfit for eating. Several of the trees have failed to produce fruit for some time past, although growing quite vigorously. A number of these were cut severely back. All the trees except one threw out numerous shoots; these had to be thinned out on several occasions. The primary shoots also formed clusters of secondary shoots which had also to be carefully thinned out to prevent overcrowding.

21. The following table shows the work carried out in the Nursery during the year as compared with the five previous years:—

TABLE I.

	1919	1920	1921	1922	1923	1924
Kinds of seeds sown	298	111	9,744	16,161	56	11,334
Seedlings basketed	15,875	12,371	11,484	9,776	5,990	8,154
do. potted	1,467	346	758	2,856	1,232	956
Plants rebasketed	3,999	1,838	3,432	4,432	5,601	4,783
Plants repotted	2,100	410	185	1,219	1,531	1,443
Plants top-dressed	12,239	190	...	...	290	1,707
Plants divided	96	217	349	502	463	649
Plants layered	550	331	803	782	350	496
Plants grafted	182	242	543	143	...	66
Cuttings basketed	418	191	59	1,016	531	182
Cuttings planted in beds	1,529	2,422	4,400	5,569	2,065	3,662
Plants tubbed	20	210	79	71	418	93

22. The following Table gives the receipts from the Ornamental section for the year as compared with the five previous years :—

TABLE II.

	1919	1920	1921	1922	1923	1924
Plants	350—\$ 48 00	2,511—\$ 309 58	1,257—\$ 177 24	1,460—\$ 265 76	988—\$ 147 77	5,981—\$ 309 71
Flowers (baskets)	150— 18 12	808— 97 84	1,065— 127 82	1,453— 174 63	1,027— 122 24	617— 149 45
Seeds (value)	...	...	...	48	...	13 42
Bamboo (bundles)	40— 4 80	57— 6 84	107— 12 92	131— 15 70	294— 35 28	313— 38 88
Delivery of plants and flowers	2 06	4 00	4 92	4 36	13 21	2 50
Pots	...	41— 8 18	35— 10 88	78— 17 98	151— 24 61	101— 21 06
Hire of Plants	5 80	13 91	3 12	14 40	20 50	12 60
Pound Fees	...	...	21 55	45 70	15 98	49 88

23. Sales for the economic section of the Botanic Gardens for 1924 are shown in the following table :—

TABLE III.

Months.	Coffee.	Cacao.	Nutmeg.	Grafted Mangoes.	Banana Suckers.	Other Economics.	Journals.	Totals.
January	...	...	2	2	...	25	18	\$ 2 16
February	...	302	3	9	200	1,125	8	27 01
March	312	150	...	...	...	35	...	7 86
April	...	24	...	...	...	42	...	1 18
May	...	400	...	...	...	96	...	7 90
June	100	401	...	...	400	113	...	8 44
July	...	200	...	...	...	38	...	3 88
August	37	13	...	...	...	32	...	1 44
September	...	03	...	...	...	27	...	68
October	14	200	...	...	...	76	...	4 40
November	...	200	...	...	...	56	...	4 04
December	273	37	...	...	...	43	1	6 14
Totals	736	1,930	5	11	600	1,708	27	75 13

Padi lbs. ...\$ 310 74
Fowls, 5 ... 13 00
Eggs, 856 ... 97 74

It will be noticed that in this table two new items appear this year, viz: Fowls and Fowl eggs. The fowls being white Leghorn breed imported by the Board of Agriculture a year ago. The hens of this breed never want to set but are steady layers except when moulting. They are probably the most profitable breed of laying fowls to be had.

24. *General.* The amount of fees collected by the Pound established in the Nursery for stray animals was \$51.19.

25. Berbice Public Gardens, Government House and other Government Gardens and Grounds.

THE BERBICE PUBLIC GARDENS AND GROUNDS.

The Berbice Public Gardens have been under the care of Mr. E. M. Morgan the Resident Agricultural Instructor. The usual careful attention was given to

these. The sub-soil drainage referred to in the previous report is working satisfactory. Further improvement in this direction is necessary in places where water still collects in time of heavy rain. The only plant of special importance which showed signs of flowering was the Talipot Palm, *Corypha umbraculifera*, which started to throw up its flowering stalk in December.

26. *The Public Buildings Grounds.*—These received the usual attention throughout the year. Two large Caryota palms that have finished flowering will have to be cut out as they are beginning to look unsightly.

Government House Gardens.—These gardens continue to improve. Lady Thomson is untiring in her interest in making them as attractive and bright as possible. Many of the heavy dark green foliage plants have been replaced by bright coloured foliage and by flowering ones. In addition to those obtainable locally Lady Thompson had a collection of Ornamental Shrubs, creepers and trees sent out from the Ceylon Botanic Gardens. A few of them were growing already in the Botanic Gardens. Most of them, however, were new to our collection. A Talipot Palm, *Corypha umbraculifera*, in these gardens is also coming into flower. This palm is celebrated as possessing the largest inflorescence; when fully grown it exhibits the enormous height of 46 feet with a breadth of 39 feet. As soon as the flowers open the fan-like foliage leaves below begin to fade and often all fall off during the flowering period so that the stem alone bearing the inflorescence at its apex remains. As soon as the fruit matures the whole plant dies down. This palm only blossoms once in its life.

The lawns too are being gradually improved by giving them a covering of three inches of fine soil, thus killing out the sourgrass and other noxious weeds. This also favours the growth of Bahama grass which is readily taking over. This grass makes excellent lawns.

27. *Municipal Gardens, Georgetown.*—Mr. Peterkin being away on leave of absence most of the year the supervision of these gardens was under Mr. Beharry and myself. Every effort was made as far as funds would allow to keep the beds, borders and walks in order. The borders are still low in places and required raising. Soil from the sewerage works might be obtained near by and with a liberal supply of manure this should improve the general condition of these borders. The lawns too require attention. Two punt loads of shell were obtained and spread on the paths. The area of the paths however being very considerable this quantity of shell did not allow of a third layer to be put on. As mentioned in previous reports much of the time of the employees is taken up in cutting flowers, making bouquets, wreaths, festoons, etc. The expenditure was \$3,346.42 while the revenue was \$1,683.46.

28. Seeds of the following were despatched abroad in exchange for others.

NAMES.	QUANTITY.
Sapium Jenmanii ...	1 packet.
Copernicia cerifera ...	1 "
Hydriastele Wendlandiana ...	1 "
Serenoa sp. (from Kew)..	1 "
Serenoa serrulata ...	1 "
Bentinckia nicobarica ...	1 "
Diplothemium caudescens ...	1 "
Euterpe edulis ...	1 "
Mauritia flexuosa]	1 "
Capsicum various ...	14 packets.

NAMES.			QUANTITY.
<i>Tobacco Seeds—</i>			
Maryland broad leaf...	...		1 packet.
Sumatra	...	...	1 „
Turkish (Samsown)	...	...	1 „
Cuban	...	...	1 „
Big Orinoco	...	...	1 „
Havana	...	...	1 „
<i>Cover crop Seeds—</i>			
Canavalia	...	...	10 ozs.
Bengal Bean	...	...	10 „
Pigeon pea	...	...	8 „

I have the honour to be,

Sir,

Your obedient Servant,

R. WARD,
Superintendent, Botanic Gardens.

THE DIRECTOR OF SCIENCE AND AGRICULTURE.

**REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31ST DECEMBER, 1924.**

APPENDIX III.

REPORT OF THE ASSISTANT BOTANIST AND MYCOLOGIST.

APPENDIX III.

BOTANIC GARDENS,
GEORGETOWN,
BRITISH GUIANA.

SIR,

I have the honour to submit herewith my report for the year ended 31st December, 1924.

In the early part of the year I was absent from the Colony for a period of three months—from the 10th of January until the 13th of April—during which I attended, as British Guiana delegate, the Ninth West Indian Agricultural Conference held in Jamaica, paid a brief visit to the United Fruit Company's cultivations in Costa Rica, and spent some six weeks in Trinidad, occupied with pathological work in Prof. S.F. Ashby's laboratory at the Imperial College of Tropical Agriculture, and in the study of local agricultural practice and conditions. My reports on the conference and subsequent visits have been published as Sessional Paper No. 49 of 1924.

PLANT DISEASE INVESTIGATIONS.

SUGAR CANE.—*Root Disease.* Isolated cases of root disease have been observed on several estates, but the year has not been characterised by any severe outbreaks, and the prevalence of this form of disease may be regarded as having been normal. The study of its etiology was continued as opportunity arose and material came to hand. Whilst working in Prof. Ashby's laboratory in Trinidad I conducted an experiment with the object of testing the pathogenicity and relation to root-rot of the fungus (*Sclerotium rolfsii*) which I had isolated from the roots of affected canes in Berbice, and at the same time made similar observations on two other species of fungi (*Rhizoctonia solani* and *Pythium sp.*) which have been associated with this disease in other cane-growing countries. In all, five strains of fungi were employed in these experiments; two of *Sclerotium rolfsii* (the other strain had been isolated in Trinidad by Prof. Ashby), two of *Rhizoctonia solani* and one of *Pythium sp.* Pure cultures (on potato mush agar) of each of these five strains were mixed with 500 grams of sterilised soil (sterilised by heating in steamer for one hour) and incubated in suitable tin containers at air temperature for six days. At the end of this period the infected soils were transferred to 10-inch plant pots, which had been partially filled with unsterilised soil. Twenty-one pots were so infected; six with the strain of *Sclerotium rolfsii* isolated in Berbice, three with the strain of this fungus isolated in Trinidad, six with a mixture of the two strains of *Rhizoctonia solani*, and six with the strain of *Pythium sp.* Three pots, to which 500 grams of sterilised but non-infected soil was similarly transferred, were set up as controls. Each of the twenty-four pots was planted with selected, healthy Bourbon cuttings, which had previously been sterilised by a ten minutes' immersion in 0.1% solution of mercuric chloride, and then washed for 30 minutes under running water. Bourbon was selected for this purpose as a variety which has the reputation of being extremely susceptible to root-rot.

The conditions of this experiment, it is true, were far removed from those which would obtain in the field, but considered in relation to host and suspected parasite they certainly favoured the latter. During the six days incubation in sterile soil the fungi made vigorous growth. The soil infected with *Rhizoctonia* had become so interpenetrated with the hyphae of the fungus that it emptied from its tin container in a compact mass which had to be broken down before it could be transferred to the pots.

A fortnight after planting, a representative series of cuttings was removed for examination. By this time, the shoots had made fair growth; the roots, in every case, were healthy though, in some, development was not well advanced. The roots of a cutting planted in soil infected with the mixed strains of *Rhizoctonia* were caked around with infected soil and overgrown by the mycelium of the fungus, but other-

wise appeared normal. At this stage I was forced to discontinue my observations owing to my departure. The brevity of the period over which this experiment was extended must necessarily influence the value of its results, but these at least indicate that the strains of fungi which were studied are not actively pathogenic, even under conditions which might be expected to have been particularly favourable to their parasitism.

During the course of my observations in the field on this disease, the roots of affected plants have repeatedly been found to be variously pierced by small punctured holes. These holes are roughly circular in outline, about 1 mm. in diameter and extend into the deeper tissues of the cortex but do not enter the hard central vascular stele. They have every appearance of being due to some animal agency, but carefully conducted searches have not, as yet, disclosed the perpetrator. This form of injury does not invariably occur, but is nevertheless not uncommon. The wounds thus formed provide, as would be expected, a means by which fungi and bacteria may effect an entrance into the soft cortical tissues of the root. It is not at present possible to say what relation these punctured holes bear to the incidence of root disease.

Top-Rot. Towards the end of July two slight outbreaks of top-rot were reported, the one from an estate on the East Coast, the other from an estate on the West Coast, Demerara. The symptoms were similar to those observed in the previous year, and it is of some interest to note that the disease made its appearance in the same month (July). I have subsequently learnt that at about the same time what was undoubtedly the same form of injury occurred on several other estates, but as the outbreaks were slight it was not considered necessary to report them. This attitude with regard to the notification of disease is unfortunate. There is a distinct tendency among both planters and farmers to delay the notification of an outbreak of disease until it has reached proportions which are sufficiently serious to engender alarm, and which, incidentally, are such as to render the question of control an extremely difficult one. Failure to bring the occurrence of a disease to the notice of this Department bears further regrettable aspects. The etiology of some of the more destructive diseases affecting staple crops in the Colony has yet to be elucidated. The more cases which are investigated the more likely is progress in this object to be advanced. Laboratory and field experiments must be supplemented by field observations, and when an outbreak of disease remains unnotified, an opportunity for field observation is lost. Furthermore under the existing circumstances it is neither possible to form an accurate conception of the distribution of a disease, nor of the losses resulting therefrom.

The disease under consideration illustrates some of the above points. The cause of top-rot in cane is still in doubt. The earliest investigators, in Java, found bacteria to be associated with this condition, and concluded from their subsequent observations that abnormal growth conditions predisposed the plants to bacterial infection. In the Argentine, as the outcome of experimental inoculations, it is held that certain bacteria which can become pathogenic during periods of high temperature and slow growth, are responsible. In Porto Rico, and in Louisiana top-rot is regarded as being an advanced symptom of root-disease. In Australia it appears to be associated with gummosis (Cobb's disease). As it occurs in this Colony, top-rot is quite distinct from root-disease. Two symptoms which, here, invariably accompany root-disease, namely—gumming of the vascular tissue in the basal nodes and internodes, and a poorly developed and rotted root system, are found to be absent in cases of top-rot.

In my preceding report it was stated that bacteria had been isolated from the cavities which are formed in the stems of affected plants. Pure cultures of these organisms (of which a third strain has since been obtained) have been inoculated into the leaves and growing points of healthy canes. The results secured, at the time of

writing, have been negative. None of the plants so treated have developed symptoms of the disease.

Three tops drawn from an affected stool of D.108 were planted out and the canes derived from two of these have been kept under observation. (The third top was removed for examination a month after planting—nothing abnormal was found). When these plants were some two months old, elongate, irregular chlorotic areas began to appear at the base of the leaves in one stool. Two months latter, an incipient crumpling of some of the younger leaves was noticeable. At the present time (seven months after planting) all shoots in this stool exhibit this symptom of crumpling. During the course of the last few weeks several of the still enrolled 'heart' leaves have begun to dry up and die. Some of the canes thus affected have been examined. The base of the immature leaves has been found to be involved in a wet, putrid rot, but as, in each case, this has been associated with borer holes and frass, and it would seem that *Diatrea* larvae must be looked upon as its predisposing cause. In the second stool the canes have not yet shown any tendency towards leaf crumpling, and it is, perhaps, significant to note that, whilst of the 12 canes in this stool only two (17%) show 'dead hearts', of the 13 canes in the stool displaying the symptom, eight (62%) have already had the 'heart' destroyed. It is to be regretted that these observations have had to be confined to two stools. I propose shortly to 'draw down' several canes from both stools and thus will be enabled to continue my studies on a more extended scale.

Chlorosis. Early in October, the Superintendent of the Sugar Planters' Experiment Station drew my attention to some canes growing at Plu. Sophia, the leaves of which exhibited a chlorotic mottling. The character of this chlorosis coupled with the stunted appearance of the plants suggested that the canes might be affected with mosaic disease, and some support was lent to this suspicion when it was learnt that they were an extension of a consignment of B.H.10(12) which had been imported from Barbados in 1920, the year in which mosaic disease had been recognised as being present in that island.

Having visited sixteen estates which had received consignments of this particular lot of cane at various periods since the date of its introduction, and carried out field inspections on eight, I submitted a report on October 24th (published as Government Notice No. 164 of 1924) embodying my views on the position at that time. In this it was stated that "A considerable proportion of a consignment of B.H.10(12) imported into this Colony from Barbados in December 1920, is affected with a chlorosis which takes the form of a pale green mottling of the leaves, typically distributed evenly over the whole leaf surface, but at times confined to one side of the midrib. It occurs most frequently on the more mature leaves, but in a small percentage of cases can be found on the youngest leaves. This chlorosis would appear to be capable of transmission, by vegetative reproduction, through successive generations, for it has appeared in progeny derived from the original consignment in various parts of the Colony on what must, at this stage, be regarded as a fairly wide range of soils.

"A general consideration of these symptoms renders them somewhat suggestive of infectious chlorosis (mosaic disease). This disease is characterised by a peculiar pale green or yellow mottling of the leaves. . . . In typical cases the mottling is always present on the youngest leaves, though it may be absent on some of the older ones, and involves the entire leaf surface. Speaking broadly, it is in this manner that the leaf symptoms of infectious chlorosis differ from those which accompany some types of chloroses attributed to defective nutrition, in which cases the mottling tends to be localised, and is not, as a rule, distributed over the whole

leaf. The fundamental points of difference, however, between mosaic disease and other forms of chlorosis is that the former is infectious, can be reproduced vegetatively, and is not influenced by variations in soil character. The entire absence, at the moment, of any indications of spread of the chlorosis from the affected stools of B.H.10(12) to neighbouring canes or weed grasses is strong evidence in support of the view that the mottling is of the non-infectious type, but cannot, however, be regarded as proof of this. For the aerial transmission of mosaic disease the presence of a suitable vector is essential.

"In view of the absence of any evidence of spread. I am of the opinion that there is at the moment, no reason for regarding the situation with alarm."

Since the above was written, time has made possible a more critical study of this disease and, as the result, I am now able to state that the chlorosis under consideration is not infectious, or that, in other words, the disease is not mosaic disease. The evidence on which this conclusion has been based is summarised below.

(a) All attempts to transmit the chlorosis to healthy cane and corn plants, utilising both insect and artificial means of inoculation, have been unsuccessful. The insect transmission experiments, begun by the Government Economic Biologist, were at his departure on leave, continued, under my supervision, by his Assistant. In these experiments, corn aphids (*Aphis maidis*), which are proved vectors of cane mosaic, were bred, under cages, on mottled plants of B.H.10(12), and transferred, after suitable periods, to healthy young corn plants, the latter being then covered with muslin bags. The plants thus inoculated have completed their life-cycles without developing any symptoms of mosaic disease. (In a similarly conducted experiment, but using aphids bred on plants known definitely to be affected with mosaic disease, Brandes (1) records a 50% infection of the corn plants, sixteen days after inoculation).

In the artificial transmission experiments, juice from the immature tissues of the apical bud of mottled plants of B.H.10(12) was injected by means of a hypodermic syringe into the region of the growing point of healthy corn and cane plants. It was so arranged, by inserting small pieces of the immature tissue into the barrel of the syringe that the expression and injection of the juice was performed in one process. (A previous mechanical expression of the juice in bulk was to be avoided, for it has been shown (2) that the virulence of infectious juice is adversely affected by exposure to the air). A clean, and recharged hypodermic was used for each inoculation, at which not less than 0.1 c.c. of freshly expressed juice was injected. In cases where the needle became choked, the inoculation was repeated until a satisfactory injection had been obtained. All the corn plants thus treated, came to maturity without developing any symptoms of mosaic disease. The cane plants have also remained healthy.

(b) The lack of evidence of spread of chlorosis in the field from affected stools of B.H.10(12) to the surrounding canes, or to weed grasses, is neither to be accounted for by the absence of a suitable vector, for it has been determined that *Aphis maidis*, although somewhat infrequent, is, nevertheless, to be found in cane cultivations, particularly on certain weed grasses, nor by the immunity of the adjacent canes or weed grasses, for of the former, the variety occurring most frequently (D.625) has proved susceptible to cane mosaic elsewhere, and of the latter, four species commonly encountered (*Echinochloa colonum*, *Syntherisma digitata*, *Syntherisma sanguinalis*, and *Eleusine indica*) are also known to be susceptible to this disease.

(c) In typical cases of mosaic disease, as has already been mentioned the mottling is always present on the youngest leaves. In my previous report it was observed

(1) Brandes, E. W. Jour. Agr. Research, v. 19, No. 10, p. 517-522, 1920.

(2) Brandes, E. W. Jour. Agr. Research v. 19, No. 3, v. 131-138, 1920, and v. 24, No. 3, v. 247-262, 1923.

that in less than 10% of the cases at Pln. Sophia did the immature leaves exhibit the chlorosis. A more general estimate based on the survey of several estates puts this figure at not more than 5%.

(d) The mottling does not, as a rule, make its appearance on the leaves of plants derived from affected cuttings until the shoots are from three to five months old, and then its occurrence may be infrequent. A careful count of a plot of plant canes propagated from affected tops, made five months after planting, showed that only 9% of the stools had developed the symptoms of chlorosis. On the other hand in a plot of five months old first ratoons, 55-60% of the stools were affected. However, from the evidence supplied by the observation of plant canes, it is to be concluded that my former statement that chlorosis "would appear to be capable of transmission by vegetative reproduction." is incorrect.

(e) The pattern produced on the leaf by the chlorotic areas bears no resemblance to that developed in authentic cases of mosaic disease on the leaves of B.H.10(12) grown in Barbados. This comparison was made by means of preserved material kindly supplied by the Director of Agriculture, Barbados.

In the light of more recent knowledge of the disease, the recommendations which were formulated last October for its control would now seem to be vitiated, for they are largely based on the tentative assumption that the disease could be transmitted in affected cuttings. When these recommendations were made, sufficient time had not elapsed to allow of this hypothesis (which had its origin in the fact that the disease had appeared indiscriminately, in progeny derived from the original importation, in widely separated areas, on a varied range of soils) being put to the test of experiment, but this has since been done, and it appears to be untenable.

The evidence now available makes it seem probable that this chlorosis is the outcome of some nutritional disturbance. That it develops in canes growing on a wide range of soils should not, perhaps, be held to indicate that the predisposing factor is one unconnected with soil conditions, but rather one that is common to soils which may otherwise differ. At this stage of my enquiry it is not possible to specify this common factor.

On several occasions it had been brought to my notice that B.H.10(12), although affected with chlorosis, yields juice containing more sucrose per gallon than that of any other variety grown in the Colony, and this fact has been adduced as evidence that the chlorosis, if not actually beneficial, is at least harmless. It is hardly necessary to point out that this contention is fallacious. Any normal autophyte, such as sugar cane, depends for its existence on the photosynthetic activities of the green colouring matter, the chlorophyll, of its leaves. It is solely by virtue of properties peculiar to this substance, that a green plant is able to utilise the energy emitted by the sun for the initiation of the synthesis of those complex organic compounds, in whose absence growth, and eventually life, ceases. It follows, therefore, that any circumstance resulting even in the partial loss, or destruction, of chlorophyll in the leaf must react unfavourably on growth. The pale green areas which give the mottled appearance to leaves affected with chlorosis, are areas which are deficient in chlorophyll, and a leaf so affected necessarily operates at a lower state of efficiency than one which is healthy.

That the yield of sucrose per gallon of juice of chlorosis-affected B.H.10(12) is higher than that of other varieties of cane, which nevertheless are healthy, shows that in spite of the chlorosis, this seedling retains its inherent tendency to store comparatively large quantities of sucrose in its stem. Although it does not inevitably follow that in the case of chlorosis-free B.H.10(12) the yield of sucrose *per gallon* would be increased—but it is not likely to be diminished—yet it is certain that, other things being equal, the yield of cane, and of sucrose, *per acre* would be appreciably improved.

Whilst this cane continues to give returns which compare favourably with the varieties more generally grown it will no doubt be retained in cultivation, and the area it occupies even extended, in spite of its being extremely subject to chlorosis. Whether these favourable returns will be maintained in later ratoon crops, or whether, as has already occurred on some estates, there will be a rapid diminution in yield, is a matter for consideration. When the history of the earlier Barbados seedlings in this Colony is reviewed it would not appear advisable to place too much reliance on this particular one, and, furthermore, it is suggested that the continued vegetative propagation of a plant affected with chlorosis is likely to be accompanied by a progressive loss of vigour.

Another form of chlorosis, more characteristic of the type associated with defective nutrition, is to be recorded from an estate on the Corentyne River, where, I understand, it is a complaint of long standing, but one which has never assumed serious proportions. The variety of cane affected in this instance is D.625. The chlorosed areas occur on the outer leaves only, and are large, irregular, and of a yellowish-green colour. On account of the extensive leaf surface involved, diseased stools, whose distribution through a field is extremely uneven, are readily distinguished at some distance. Six stools raised, here, from tops drawn from affected plants, have been kept under observation for eight months, and have not, during that period, developed any signs of chlorosis.

Ring-Spot. Ring-spot disease of the leaf (caused by the fungus *Leptosphaeria sacchari*) although of common occurrence, especially in fields of cane which are approaching maturity, may under normal circumstances be regarded as a disease of minor importance for infection is as a rule confined to senescent leaves. However conditions periodically arise, which, favouring the spread of the fungus and reducing the resistance of the plants, result in sharp local epidemics. A somewhat severe outbreak of this nature took place during the year on an East Coast estate, and the existence of well defined varietal susceptibility was brought out prominently in this particular instance. The field in which the epidemic occurred had been planted to D.625, D.109, and D.145, and whilst the first named variety passed through almost unscathed, the latter two were severely attacked. The comparative susceptibility of D.145 to this disease has been observed on more than one previous occasion.

Other Diseases.—Pineapple disease (*Thielaviopsis paradoxa*) has occasionally been encountered; its prevalence would seem to be greatest on pegass soils. Infections by *Cercospora vaginæ*, the organism causing red-spot disease of the leaf sheath, are to be found on most canes. *Melanconium sacchari* invariably occurs as a secondary infection on plants debilitated by root-disease. A mycetozoon (*Stemonitis sp.*) is to be recorded from Berbice on mature leaves, but there is no reason to believe that this organism is other than strictly saprophytic.

COCONUTS.—‘*Bud Rot*’—The gradual elimination of the coconut palm in certain localities, which has now been in progress for some years as the result of the pathological condition known as ‘bud-rot’ has been maintained with what appears to be accustomed severity.

The affection which is responsible for these widespread and continued losses is in my opinion, falsely designated by the name of ‘bud-rot.’ The earliest and most characteristic symptom of specific bud-rot, a disease caused by a species of *Phytophthora*, is infection of the bud, followed by collapse of the whole central whorl, which falls over leaving the trunk crowned by a ring of green leaves. My observations on the disease which occurs here have convinced me that, as a general rule, the bud is the last portion of the crown to become affected, and that almost an invariable feature of this form of injury is the progressive death of the leaves from below upwards. Consideration of the evidence which has been forthcoming has led me to believe that this disease is not induced by the operations of any specific organism but is primarily to be attributed to unfavourable soil conditions whose deleterious effects have in many instances been aggravated by cultural neglect.

The selection of areas for planting this crop seem often to have been made without due regard to its requirements. The cultivations which are at the moment the more severely affected are those situated either on low lying, badly drained heavy clay front lands, or on pegass soils which suffer from similar disabilities. The minimum of cultural treatment is given. At the best this consists in a very occasional weeding, and an equally infrequent cleaning of drains. I have been informed on some plantations that fields are picked only on their outskirts for the 'bush,' which has been allowed to grow up between the palms, prevents free access to their interior. And on more than one occasion I have found it impossible to progress through such 'cultivations' without the aid of a cutlass which was constantly needed to clear a path through a similar undergrowth. How long this form of neglect has been in operation I am not in the position to say, but I understand from a very early period in the lives of the trees.

It is not unusual to find cultivators laying the blame for the spread of the disease into their fields on their neighbours; I doubt whether this accusation is ever strictly justified. If any blame is to be laid, though there would seem little to be gained at the present day by the search for a scapegoat, it would be more in accordance with the facts to assign it to the circumstances which originally influenced the selection of the site occupied by the cultivations, and which have since been responsible for the neglect of suitable cultural treatment.

In the case of younger cultivations it would no doubt be possible to overcome, to some extent at least, the disadvantages arising from the unsuitable situation of the land and nature of the soil by devoting strict attention to tillage and to adequate drainage, but, even did economic conditions permit the expenditure that this would necessitate, it is questionable whether on the older cultivations the harm resulting from fifteen or more years of neglect could ever be completely recovered.

The destruction of dead and dying palms by fire is, if carried out effectively, undoubtedly an expensive operation. It is to be assumed however that this measure ensures the elimination of a large number of organisms capable of infecting, and ultimately encompassing the death of already debilitated trees. But it can hardly be expected to have any continued beneficial effect unless it is accompanied by a distinct improvement in cultural methods, and therefore under existing conditions it is perhaps only right to admit that the value of this control measure, considered from its economic aspect, may be open to some criticism. Whether this criticism is merited seems a point which is worthy of a careful investigation.

Red-Ring.—Red-ring, an infectious disease caused by the parasitism of a nematode worm (*Aphelenchus cocophilus*) was reported as being present in the Colony in 1920. I have, as yet, been unable to confirm this record.

RICE.—*Blast.* A noticeable epidemic of blast, a disease associated with a fungus, *Piricularia grisea*, occurred during the year in one of the experimental rice fields. Marked variations in varietal susceptibility were to be observed. A recently imported Ceylon variety, H.J. 16 was so severely attacked that it appeared as though fire had passed through it. In spite of this severe check, on being cut back, it ratooned well and eventually came to maturity, indicating that in addition to the fungus, other factors are associated with outbreaks of this disease. None of the varieties present in this field exhibited immunity. The Demerara varieties, H.35, H.37, 75, 78, 79, and *McKenzie City*, and the Louisiana variety, *Blue-Rose*, were all slightly affected.

It was observed that infection takes place commonly on the leaf or at the junction of the leaf blade and sheath. In the former case minute brown spots appear on the leaf surface, which gradually lengthening in the direction of the long axis, develop into elongate, oval, brown areas, the centres of which in time take on a grayish colour owing to the extrusion of conidiophores and production of conidia;

these reproductive bodies are developed on both surfaces. The spots enlarge, become confluent, and finally the entire leaf blade is destroyed. If infection takes place at the junction of lamina and sheath the tissue in that region loses turgor, and the leaf falls over. Infection from this point may spread down the sheath and involve the stem.

The presence of this disease in the Colony was recorded for the first time by Bancroft in 1914. No information is available as to its present distribution or as to the amount of damage it incurs.

PLANTAINS.—A disease affecting plantains and the dwarf banana (*Musa cavendishii*) has been under investigation since the latter part of the year. It presents several features which lead to the belief that it is infectious and may be of a similar nature to the malady described by Rorer from Trinidad under the name of 'moko-disease.'

What appears to have been the same disease was first recorded by Stockdale in 1909, and was then stated to have been present in the Colony for some years. It would seem to occur wherever plantains are grown. During the year under review it is definitely to be recorded from the Pomeroun, the Essequibo Coast, and the West and East Coasts, Demerara. From my brief acquaintance with it I believe it to be responsible, in the aggregate, for heavy losses, and, as the plantain is a food crop of considerable importance in this Colony, its ravages must be regarded with some concern. Its etiology has not yet been clearly elucidated. The adoption of control measures based on existing knowledge of its nature have been advocated from time to time by officers of this Department, but it is to be feared that few farmers have ever availed themselves of the advice thus given. This apathy is difficult to explain unless it be attributable to a tendency to look upon the incidence of disease as due to supernatural causes.

CACAO.—Witch-broom disease (*Marasmius perniciosus*) is still prevalent in many cultivations. In spite of the advice issued by the Board of Agriculture the attitude of cultivators with reference to control measures remains unchanged. A few in fact appear to regard the abortions produced by this fungus much in the same light in which they regard the cacao pods—as natural and necessary developments of growth. Owing to the neglected condition of some of the larger cultivations infection has probably reached a maximum, for it is to be expected that a state of equilibrium now exists between host and parasite, so that any further extension of the disease in these cases is unlikely. Failure to adopt ordinary measures of field sanitation, and unduly heavy shade continue to maintain the losses due to pod-rot (*Phytophthora faberi*.)

COFFEE.—A wilt disease of Liberian coffee which occurred on an estate on the Pomeroun River has been the subject of an enquiry which is still proceeding. This is understood to have been an isolated outbreak. The affected bushes were 12 to 14 years old, and were growing on a shallow pegass soil underlain by clay. The wilting appeared to be fairly uniform and rapid, and was associated with rather ill-defined chlorosis. The withered leaves remained attached to the branches after the death of the tree. There was evidence of some root-rot, and a fungus which is at present unidentified has been isolated from this region. The external symptoms bear a superficial resemblance to those of the phloem-necrosis described from Surinam by Stahel, but this identity has not yet been established. It was apparent that the drainage of the fields in which the disease occurred was in need of improvement; at the time of my visit water was to be reached at a depth of 18 inches to 2 feet.

PARA-RUBBER.—Whilst most of the inland rubber cultivations have now been abandoned on account of the ravages caused by the endemic leaf disease (*Melanop-sammopsis ulei*) it is noticeable that many small plantations situated on the coast are

comparatively free from infection. This apparent immunity of coastal cultivations seems to be related to the question of atmospheric humidity. It has been shown by Stahel in Surinam that a persistent film of dew on the leaves is necessary for the germination of the conidia of the causal fungus, and therefore for infection; for this reason, cultivations in positions exposed to the moderating influence of the trade winds are, as a rule, only slightly affected but those in situations subject to enveloping mists are liable to severe epidemics.

MISCELLANEOUS CROPS.—Mango anthracnose (*Gloeosporium mangiferae*) has been extremely abundant. Fruit that is not disfigured by the unsightly brown spots produced by this fungus is a rarity. The black spot disease of roses caused by *Diplocarpon rosae* which is of common occurrence on these plants became mildly epidemic towards the fall of the year, and caused some concern.

JENMAN HERBARIUM.

It is to be regretted that limited progress has been made with the general work of repairing or renewing the older, deteriorated sheets. This task requires extreme care, and necessitates personal supervision; the insistence of other duties has seldom permitted the latter.

The reorganisation of the main collection of grasses carried out in accordance with the determinations made by Dr. A. S. Hitchcock (1), Systematic Agrostologist of the United States Department of Agriculture, which was begun in 1923, has now been completed. A subsidiary collection, which has since been separated from the large amount of unclassified material present in the Herbarium, is gradually being incorporated. It is proposed to submit any of this material the identity of which is at all doubtful to Dr. Hitchcock for the favour of his authoritative opinion.

A small consignment of specimens forming part of the collection made in 1923, was sent during the year to the Royal Botanic Gardens, Kew, for identification. The complete determinations of most of these have since been received. It has proved impracticable to name the few remaining species in the absence of revisions of the genera concerned. It may, perhaps, be remarked that this circumstance would be less likely to arise were a Flora of the Colony in the course of preparation. Among the species which have been determined, the following are now represented in the Herbarium for the first time, and do not appear to have been recorded previously from the Colony.

Oldenlandia callitrichoides, Griseb. a weed in cultivated ground, Georgetown.

Memora flavida, Bur. et K. Schum. climbing over low bush, Kalacoon, Mazaroni River.

Part of the collection of *Passiflora* was loaned to the United States National Museum, and Mr. Ellsworth P. Killip of the United States National Herbarium, who is engaged on a revision of the tropical American species of this genus, has been kind enough to affix his identifications to these sheets. In order that the remainder of this material, most of which is unidentified, may secure the benefit of Mr. Killip's determinations, it is shortly being forwarded to the United States.

The Herbarium specimens of the genus *Phaseolus* were submitted by request to Prof. C. V. Piper, Senior Agronomist in charge of Forage Crop Investigations, United States Department of Agriculture, who is revising this group and he has most courteously checked and corrected the nomenclature of this material.

Little opportunity for securing additional specimens has occurred during the year. Small collections have been made on the lower Pomeroon River, the Essequibo Coast, and the lower Demerara River. The general work of preparation and

(1) Hitchcock, A. S. Grasses of British Guiana. In Contr. U.S. Nat. Herb. v. 22: 6. 1922.

mounting has been carefully and satisfactorily performed by the Herbarium Assistant.

BOTANICAL LIBRARY.

A cumulative index of the issues of 'Hooker's *Icones Plantarum*' present in this library has been compiled; this contains some 2,600 entries. The usual publications have been received during the year.

I have the honour to be,

Sir,

Your obedient Servant,

R. A. ALTSON,

Assistant Botanist and Mycologist.

THE DIRECTOR OF SCIENCE AND AGRICULTURE.

REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31ST DECEMBER, 1924.

APPENDIX IV.

REPORT ON AGRICULTURAL INSTRUCTION.

APPENDIX IV.

BOTANIC GARDENS,
GEORGETOWN, DEMERARA,
30th April, 1925.

SIR,

I have the honour to submit a report on Agricultural Instruction from the North West District, the Pomeroon District, the East Coast, Demerara, the County of Berbice, and the Districts under the Agricultural Instructors as well as an abstract of the report of the Superintendent of District Gardens.

2. In the North West District the rubber cultivation on the higher lands has much improved, and many of the trees are now free from disease. The records of the growth of the Hevea and Balata trees are being carefully kept. Owing to the great improvement in the drainage of the East Coast District, Demerara, larger returns of agricultural produce are expected. Throughout the County of Berbice the weather conditions during the year were favourable to the growth of crops.

Weather conditions in the Pomeroon were also good for plant growth. This district reports an increase of 240 acres in the area under ground provisions.

Valuable advice was given by the Agricultural Instructors in all the districts, and reports show that their efforts have been attended with success.

3. The Agricultural Instructor, North West District, reports :—

“Regular visits were paid to the farms during the year under review, and practical demonstrations were held in the field. Lessons in connection with the various crops cultivated, the treatment of the soils, and the control of plant diseases and insect pests were given. I also gave lectures on agriculture to the farmers and school children.”

COFFEE.

“I am glad to be able to report that the area under cultivation has been extended by 235 acres during the period under review, and there is a general improvement on many of the cultivations.”

CACAO.

“On the whole the cultivation has been fairly well maintained, and will be pushed on as far as practicable.”

RICE.

“During the year twenty-two acres were planted. The crop which was harvested gave a very poor yield, and a considerable percentage of the padi was destroyed by birds. The crop was practically a failure.”

RUBBER.

“A large number of the trees have died out on the grants of the Consolidated Rubber and Balata Estates, Ltd. No cultural work has been carried out on the cultivation which is in a semi-state of abandonment.”

LIMES.

“The area under cultivation remains the same as in the previous year, and many of the trees are producing large and juicy fruits.”

COCONUTS.

“This cultivation is on the decline, and the farmers are now convinced that the pegass soil is unsuitable for growing this palm.”

BANANAS, GROUND PROVISIONS AND CORN.

"The area under these crops has been reduced by 44 acres, the cause being due to shortage of agricultural labour. I am however, glad to be able to report that the farmers did their utmost to maintain their cultivations in good order, and many of them are running their farms on thorough agricultural lines."

4. The Agricultural Instructor, Belfield, East Coast, reports as follows :—

"The year under review was one of great possibilities from an agricultural point of view. The weather conditions were all that could be desired, but the farmers in the lower part of the district were too pessimistic to take full advantage of their opportunities."

"The installation of pumping stations has helped to alleviate all fears that the crops will be lost in future, but one has to consider that the peasant proprietors in these parts have become so suspicious after the frequent inundations, that it will take time to awaken new interests in cultivating their lands to the fullest extent."

"In some places an attempt was made by some farmers to reclaim lands, which had been thrown out of cultivation, with such success that others are beginning to follow the example."

RICE.

"The rice cultivation which shrank considerably during the last three or four years remained almost the same for want of capital and a better market."

CANE-FARMING.

The area under farmers' canes was the same as in the previous year.

GROUND PROVISIONS AND PLANTAINS.

"Where drainage existed there was a considerable increase in the acreage under plantains and ground provisions; excellent results were obtained as regards the crops reaped, and the prices obtained for same were satisfactory."

5. The Agricultural Instructor, New Amsterdam, Berbice, reports as follows :—

"The condition of the weather during the period under report was favourable to all cultivations."

"Regular visits were paid to the farmers in the various parts of the district. I am pleased to report that there has been great improvement shown on the farms, especially with respect to drainage. The crops under cultivation are divided under two heads :

"(a) Grounds provisions which comprise plantains, bananas, cassava, tannias, eddoes, yams, sweet potatoes, Indian corn (maize), peas and rice."

"(b) Permanent crops consisting of citrus varieties, sapodillas, avocado pears, guavas, breadfruit, cacao, coffee, coconuts, etc."

"The cultivation of ground provisions has slightly increased due to favourable weather conditions. Greater attention has been given to the planting of maize, sweet potatoes, yams, cassava, plantains, and bananas, and the yield per acre was very satisfactory. When the new Government drainage schemes are completed much larger returns are expected as the Corentyne Coast possesses very rich soils suitable for growing all tropical crops."

RICE.

"The weather being favourable every effort was made to increase the acreage of the previous year. The acreage in Berbice was over 17,000 acres and the yield per acre has been estimated at 17 bags. There is still a large number of farmers who do not adhere to planting at the proper time although instructions

"are imparted to them regularly. The condition of the crop was exceedingly healthy except in a few places where there was evidence of a bug (probably the *Mormidea poecila* Dall), which insect sucks the padi immediately after fertilization. This insect, however, did not cause any considerable damage."

COCONUTS.

"This crop is sparsely cultivated throughout the villages, but there are several coconut estates. On very few of these properties has sufficient care been taken to keep the cultivations free from weeds and bushes; and only one weeding a year is given. This is a deplorable state of affairs; for in consequence there is a great reduction in the number of trees bearing."

CACAO.

"The cultivation of cacao has shewn slight improvement. Demonstrations in pruning, and selecting good healthy pods for future planting were given during the year. The plants are doing very well, but much more work is required to be carried out by the farmer to control the witch-broom disease which has infested the cultivations."

6. The Agricultural Instructor, Marlborough, Pomeroon, reports as follows:—

"Visits of inspection were paid to the farms, and advice given as to the cultivation of the crops. The importance of good drainage was explained, and the careful selection of seed was shewn to result in crops of better quality and higher yield. Rotation of crops was also shewn to be most beneficial especially when leguminous crops were included. The control of disease and insect pests was also explained. Of great importance in disease control was the planting of healthy plants."

"Farmers were advised to plant more ground provisions. The fact that sweet potatoes, which are at present largely imported, could be easily and profitably grown locally, was brought to their notice."

"The prices paid to farmers for their produce was satisfactory. Coconuts advanced in price while coffee has also shown an upward tendency."

COCONUTS.

"The area under coconuts shows an increase of 31 acres. Careful selection of nuts for planting from trees of not less than 25 years of age was recommended. I explained the great necessity of proper drainage, and the clearing of bush from between the trees."

COFFEE.

"An increase is also shown under this head, the amount being 73 acres. Improvement in the condition of the coffee farms continues to be observed. Weeding gets better attention and the removal of bird-vine is regularly carried out, and trees are well pruned at the proper time. The farmers are finding out that it pays to give proper attention to the crops as a better return results, and the good prices at present prevailing act as a stimulant in encouraging the farmers to keep their farms up to the mark."

CORN.

"The area under corn has increased by 158 acres during the year. The quality grown was good, and the yield fair. This is attributed to a better appreciation of seed selection."

GROUND PROVISIONS AND PLANTAINS.

"The increased area under this head is 244 acres. It is important that more care be taken in the selection of suckers from healthy fields."

DISTRICT AGRICULTURAL INSTRUCTORS.

7. Twelve monthly reports were received from each of the following District Agricultural Instructors:—

John E. Wilson, in charge of the Essequibo Islands District; R. R. Pasea, in charge of the North Eastern Section, Essequibo Coast; C. Humphreys, in charge of the East Bank Demerara River District; J. M. Cush, in charge of the Berbice River District; J. M. Antrobus, in charge of the West Bank and Canals Polder District; Demerara River; R. R. Ross, in charge of the West Coast Berbice District; Thomas A. Archer, in charge of the Parika and Leguan District; D. W. Fingal, in charge of the Corentyne District; D. D. Haynes, in charge of the Mahaica-Mahaicony District.

8. The Instructor in charge of the Essequibo Islands District continues to give useful instructional work, especially with regard to drainage and seed selection.

9. The reports of the Inspector in charge of the North East Section of the Essequibo Coast show that he gave special instruction to rice and sugar cane farmers, and in the improvement of stock.

10. The Instructor in charge of the East Bank, Demerara River District, reports that he gave instructions principally in the control of plant disease and pests.

11. According to the reports of the Instructor in charge of the West Bank and Canals Polder District, instruction was given in drainage, pruning and weeding.

12. The reports of the Instructor in charge of the West Coast Berbice District show that valuable advice was again given in control work in connection with plant diseases and pests and the improvement of stock.

13. The Instructor in charge of the Parika and Leguan Districts show that good advice was imparted to the farmers especially in the improvement of stock, the destruction of trees infected with Bud-rot and the early planting of rice.

14. Reports submitted by the Instructor for the Mahaica-Mahaicony District indicate that advice was given in connection with plant diseases and pests on the coconut plantations. An improvement in this District has been noticed. Advice was also given as to the proper time for planting rice.

15. Reports handed in by the Instructor in charge of the Corentyne District show that the farmers have shewn great improvement especially with regard to drainage. The weather was suitable for all kinds of crops. The farmers who planted rice at the proper time benefited by larger crops of good quality grain. A further improvement in the cultivation of rice has been noted.

16. During the year under review the following District Gardens were regularly inspected:—

Bourda, Georgetown, Demerara;
Houston, East Bank, Demerara;
Belfield, East Coast, Demerara;
Den Amstel, West Coast, Demerara;
Wakenaam, Essequibo;
Suddie, Essequibo; and
Stanleytown, New Amsterdam, Berbice.

The Agricultural Assistant gave lectures and demonstrations in gardening to the school children at each of these District Gardens, and the instruction given has been greatly appreciated by the pupils.

A good number of the children, after instruction, succeed in forming gardens at their own homes and compete for prizes ; and excellent results are being obtained through the continued efforts of parent, pupil and teacher.

17. The following are the numbers of children attending the school gardens:—

Gardens.			Attendances.
Bourda, Georgetown, Demerara	...	...	4,123
Houston, East Bank, „	...	...	2,146
Belfield, East Coast, „	...	...	2,827
Den Amstel, West Coast,	...	...	1,678
Wakenaam, Essequibo ...	...	...	1,664
Suddie, „ ...	...	...	1,789
Stanleytown, New Amsterdam, Berbice...	...	...	1,103
			<hr/>
			15,330
			<hr/>

I have the honour to be,

Sir,

Your obedient Servant,

W. FRANCIS,
Assistant Director.

THE DIRECTOR OF SCIENCE AND AGRICULTURE.

REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31st DECEMBER, 1924.

APPENDIX V.

REPORT ON THE WORKING OF THE BIOLOGICAL DIVISION.

APPENDIX V.

BIOLOGICAL DIVISION,
5TH FEBRUARY, 1925.

SIR,

I have the honour to submit the following report on the working of the Biological Division of this Department for the year 1924.

The subjects which have engaged the attention of the Division during that period will be dealt with, according to custom, under the various crops concerned, followed by such miscellaneous investigations as have also been undertaken.

I was absent from the Colony on short leave from 1st to 30th April, on the grounds of urgent private affairs. During the absence on leave of the Honorary Secretary of the Committee of Correspondence and Exhibition, I acted in this capacity from May to October, and served as honorary Secretary to the Committee appointed to enquire into the working of the British Guiana Museum.

Sugar-cane.—Perhaps the most important happening with regard to sugar-cane during the year from an entomological point of view was the introduction into the colony of a small number of what is generally known as the Cuban tachinid parasite of the small moth borer, viz., *Euzenilliopsis diatraeae* Towns. This introduction was carried out by Mr. Harold E. Box, working under instructions from Messrs. S. Davson & Co., part of the cost of the undertaking being defrayed by the B. G. Sugar Planters' Experiment Station. Porto Rico was the island selected by Mr. Box as the source from which the parasites were to be obtained, being the most suitable place with regard to transport facilities, at the same time it being possible to obtain adequate material there for his project. Mr. Box left Georgetown on 24th April, and returned on 13th July. The parasites which were brought to the colony were liberated in the fields at Pln. Blairmont, Berbice. As to the success of this venture, either from a purely entomological, or from a commercial, point of view, it is impossible at present to make any statement, for no attempt as far as I am aware, has been made up to the time of writing to ascertain if the parasites have established themselves in this colony.

As this report is being written a publication entitled "Sugar Cane Insects 1924" by Messrs. T. E. Holloway and W. E. Haley, of the U. S. Department of Agriculture, has been received, in which the soaking of tops in cold water for 72 hours is recommended as a means of aiding in the control of the small moth borer. This method was recommended by me in a paper entitled "Notes on the Small Moth-Borers of Sugar-Cane in British Guiana" published in the Jl. Bd. of Agric., October 1922, and in the Bull. Ent. Res., Vol. XIII., Pt. 4, April 1923, and also in the report of this Division for 1922, and had actually been used by me early in 1921. Unfortunately, one cannot yet say that it is the general practice in this colony, in spite of the fact that the conditions here are considerably more in favour of such a method of control than in the U.S.A.

About the middle of July there was a severe outbreak of the Grass Looper, *Mocis repanda* Fabr., on sugar-cane throughout the colony, which in some instances completely stripped many acres of their leaves. This insect invariably appears in these enormous numbers after a period of long dry weather, as was the case this year, and on such occasions must be considered a serious pest. Although the damage done does not result in the death of the cane, and for that reason is liable to be looked on as of little importance by some persons, the complete removal of practically all the leaf area must of necessity set back the plants for several weeks—say two months. If this loss of growth be expressed in pounds of sugar per acre it will at once be seen that it is an appreciable amount, especially if the damaged area with some hundred and fifty acres in extent, as was observed in one instance.

The insect can be controlled with lead or other arsenate, either sprayed or dusted. Outbreaks can often be spotted weeks before they assume the proportions which they usually attain, for it is admitted in most instances that the caterpillars are noticed feeding on grass before they attack the canes, often commencing on the dams or in abandoned fields. Fields which are not clean weeded and contain a fair amount of grass are for this reason severely attacked. As soon as the first signs of an attack is observed a careful watch should be kept upon it, and at the least sign of its spreading, gangs should be turned on to spray or dust the area. In this connection it would be advisable for every estate to keep a stock of one of the poisons and the necessary spraying or dusting apparatus; they might not often be used, but when the necessity arises the advantage of having them at hand—in good working order—and being thus able to frustrate the attack at its start, would amply repay the small outlay.

As was expected from previous experience with this pest the generation which followed did no appreciable damage, in fact were hardly to be observed, and this was no doubt due to the appearance of natural enemies, which got the pest under control. Until the present outbreak none of these enemies of this pest had been observed in this colony, but on this occasion a Sarcophagid fly, *Sarcophaga chrysostoma* Wied., was reared from the pupae of *Mocis*, and this insect no doubt did much to control the pest.

During the year certain canes at the B. G. Sugar Planters' Experiment Station were observed to be "mottled" and came under suspicion as being possibly affected with Mosaic Disease. In conjunction with Mr. R. A. Altson, Assistant Botanist and Mycologist of this Department, investigations were undertaken.

In this connection a collection of Aphids on grass and other hostplants was made, including sugar-cane, the species collected on this hostplant proving to be *Hysteronensa setairae* Thos. A list of other aphids collected, together with their hostplants, will be given elsewhere in this report.

Coconuts.—There was no serious outbreak of any pest on coconuts during the year. In August, on the northern side of Wakenaam Island, coconut palms were attacked by the large locust *Tropidacris latereillei* Perty, but the damage done was not extensive. As has been observed in previous outbreaks of this pest in other parts of the colony, the insects were feeding principally upon *Quassia bitters* (*Quassia amara*) growing on the sand reef and only turned their attention to coconuts later.

The more one sees of the coconut areas in the colony, the more one is impressed by their generally unkempt state and the lack of any real cultivation of the crop. To ascribe as reason for this is not always easy, but at least in a very large proportion of the cases it can be attributed to the fact that land itself in this colony is too easily, or too cheaply, acquired, and in individuals whose circumstances—and circumstances must here be employed in its wide sense—do not allow of their properly handling but a small acreage are in possession of holdings many times the size of that which they can beneficially occupy. It is such unkempt condition of coconut groves, often in conjunction with pecuniary incapability of the owners, that makes it difficult if not impossible to offer methods of control against insect pests. Coupled with the prevailing indifference in such matters and an attitude of passive resistance—to hinder rather than to help—these may be taken as characteristic of the mentality of the general cultivator of the colony, and these difficulties occur with practically every crop grown in the colony.

MISCELLANEOUS INVESTIGATIONS.

Timber boring Beetles.—The determinations of beetles attacking greenheart reported in my previous report were received during the year and are given below. These determinations were made by Colonel Winn Sampson, through the Imperial

Bureau of Entomology. At the same time a collection of beetles attacking walaba wood were also made, and the names of these insects are also given below.

Greenheart boring beetles:—

Platypus mulsanti Chap
Platypus alternans Chap. var.
Platypus sp.

Walaba boring beetles;—

Xyleborus obruens Smp. sp.n.
Xyleborus torquatus Eich.
Xyleborus affinis Eich. var.
Xyleborus intersetosus Bldf.
Xyleborus confusus. Eich.
Xyleborus fuscatus Eich.
Xyleborus sp.
Platypus sp.
Silvanus trivialis Crouv.

Of the species collected one, *Xyleborus obruens* Smp., proved to be entirely new to science.

Mosquitoes.—An interesting investigation which was commenced towards the close of the year was the breeding of certain mosquitoes along the foreshore of Kitty Village in the vicinity of Georgetown. The result of this investigation revealed the fact that the Anopheline mosquito, *Anopheles tarsimaculata* Goeldi., breeds at certain times in the salt water pools in this area. The well known salt-marsh species *Aedes taeniorhynchus* Wied., was also found breeding in this area.

The question of Anopheline mosquitoes breeding under such conditions will be further investigated, and if the result warrant it an account will be published at a later date.

Aphids.—As mentioned elsewhere in this report a collection of some commoner aphids were made, and the following is the list of species collected with their host-plants.

Carolinia cyperi Ainstee. on *Cyperus rotunda* "nut-grass."

Hysteroneusa setairae Thos., on *Panicum barbinode* "Para-grass" also Sugar-cane and Sorghum.

Aphis maidis Fitch., on Sorghum, Indian Corn and *Panicum barbinode*.

Aphis gossypii Gov., on Cotton and *Ruellia tuberosa* "Many-roots."

Aphis sp., on *Ruellia tuberosa*.

Collection and Card Index.—The collection continues to increase, and the keeping of it in good condition occupies a good deal of time. This collection as it increases in size becomes more and more valuable, especially as a large proportion of the insects have been determined by specialists in the various orders.

A considerable amount of work was done during the year in the cataloguing of the collections, and over 7,000 new cards were prepared. When the system is completed it will be highly efficient.

Consignment of insects for determination have been regularly sent to the Imperial Bureau of Entomology during the year. The Bureau has been of the greatest assistance to the Division in this and other ways.

I have the honour to be,

Sir,

Your obedient Servant,

L. D. CLEARE, Jnr.,
Government Economic Biologist.

The Director,
Science and Agriculture.

REPORTS OF THE DEPARTMENT OF SCIENCE AND AGRICULTURE
FOR THE YEAR ENDED 31ST DECEMBER, 1924.

APPENDIX VI.

REPORT OF THE VETERINARY DIVISION.

APPENDIX VI.

SCIENCE AND AGRICULTURE DEPARTMENT.

VETERINARY DIVISION,

Georgetown, Demerara.

23rd March, 1925.

SIR,

In submitting my report for the year ended the 31st December, 1924, I have the honour to state that the general health of the live stock of the Colony has been satisfactory. I am glad to be able again to record the absence of Anthrax.

Owing to owners of animals notifying sudden deaths sooner than formerly, we have now more efficient control over any possible outbreak of disease.

LIVE STOCK AT THE GARDENS.

2. *Pure Bred Cattle* :—

Bulls	...	Holstein	...	1
Bulls	...	Guernsey	...	1
Cows	...	Holstein	...	2

Calves :—

Bull	...	Holstein	...	1
Heifer	...	Holstein	...	1

These animals were imported during the year. The cows calved a few months after their arrival. They are not related, and were served by different bulls, so that in a few years' time we should have a good herd of Holsteins. The imported Holstein bull is a particularly fine animal.

3. The White Leghorns, 2 cocks and 12 hens, imported during the year, are doing remarkably well. They have laid 1,000 eggs already, and these have been sold at \$1.20 per dozen.

LIVE STOCK AT ONDERNEEMING FARM.

4. Thoroughbred Shorthorn Bull	...	1
Thoroughbred Shorthorn Heifer	...	1
Cows	...	21
Bull calves	...	4
Heifer calves	...	4

Sheep :—

Imported rams	...	1
Local rams	...	4
Ram lambs	...	1
Ewes	...	21

Buffaloes :—

Bulls	...	2
Cows	...	7
Heifers	...	8
Calves	...	3

Pigs :—

...	...	38
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Fowls :—

Plymouth Rock Cocks	...	12
Plymouth Rock Hens	...	21
Chicks	...	2

The whole of the stock has kept in good health and is in fair condition with the exception of a few cows that I suggest be disposed of.

PENAL SETTLEMENT.

5. Thoroughbred Shorthorn Bull ...	...	...	1
Cows	...	...	22
Young Bulls	...	...	3
Heifers	...	...	6

Buffaloes :—

Bulls	...	...	2
Cows	...	...	8
Young Bulls	...	...	2
Heifers	...	...	4

The Stock is in splendid condition and has kept in perfect health during the year. I would like to see the pastures get a good top dressing of lime as I am sure this would greatly improve the quality of the grass.

During the year freshly imported Plymouth Rock fowls were sent up, which, I am sorry to state, have not done well.

MOUNTED POLICE.

6. The following is a table of the year's work :—

	A. Troop.	B. Troop.
Number of visits paid in 1924 ...	61	55
„ of animals on strength	22	23
„ of horses died	Nil.	Nil.
„ of horses purchased	Nil.	6
„ of horses condemned	3	3

There was no sale of Police horses during the year. Six animals were removed from the force :—one destroyed, three superannuated, one for the Police Ambulance and one to the Stud Farm. Excepting the last mentioned, old age was the deciding factor in disposing of these horses.

Forage supplied by the contractors has been of good average quality, the oats being well above contract weight per bushel.

The average age of the horses now stands at about 9 years. For 50 horses this can be considered a useful average.

The last of the originals who commenced service with the Mounted Police in 1905 “the date of their inception” was superannuated.

STUD FARM.

7. The Government Stud Farm, started on 1st January, 1923, continued in existence during 1924.

Brood Mares	...	...	4
Three year olds	...	...	4
Three foals	...	...	3

Sergeant-Major Billyeald, who is in charge of the Farm, makes on an average four visits weekly—inspecting the animals, and attending services given by the Stallion. Two old mares were destroyed. Four 3 year olds were taken over by the Mounted Police. Six mares were served by Waterbass. Waterbass and the Stallion donkeys are in good condition.

I have the honour to be,

Sir,

Your obedient Servant,

A. SETON MILNE,

Government Veterinary Surgeon.

THE DIRECTOR OF SCIENCE AND AGRICULTURE.